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THE GAS JOURNAL

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A Glance at the Contents—

Stoke-on-Trent Extension Bill.

By 73 votes to 31, the House of Lords rejected the Stoke-on-Trent Extension Bill for the second time in eight months. [*See p.* 805.]

Corrosion of Gasholders.

Mr. Leslie W. Dunn, Gas Engineer to Messrs. Alexander Duckham & Co., Ltd., discusses the virtues of oil filming as a preventive against corrosion in gasholders. [*See p.* 781.]

New B.E.S.A. Specifications.

The British Engineering Standards Association have published Specifications for Valve Fittings for Compressed Gas Cylinders and Identification Colours for Gas Cylinders. [*See p.* 775.]

Triumph for Gas Over Electricity.

In a corner of South-East London a notable victory has been won for gas lighting. The arena in which this battle was fought is a covered and enclosed area devoted to the historic and ancient game with which is associated the name of Sir Francis Drake. [*See p.* 780.]

New Coke Ovens at Magdeburg.

The Town of Magdeburg, Germany, have recently put into commission a battery of sixty Hinselmann compound ovens. The installation was built in accordance with the system and patents of the Hinselmann Koksofenbaugesellschaft m.b.H., of Essen, whose representatives in the British Empire are Messrs. Donald Bagley, Ltd., of 124, Victoria Street, Westminster, S.W. 1. [*See p.* 777.]

Gas Drying at Tottenham.

The benefits accruing from the installation of two Holmes "Dri-Gas" plants at the works of the Tottenham and District Gas Company are considered by Mr. H. C. Smith in his Presidential Address to the Southern Association of Gas Engineers and Managers. "I believe," he says, "that in the course of a year or two our troubles from stopped services will cease entirely." The plants at Tottenham combine naphthalene washing with gas drying. [*See p.* 787.]

Gas at the South London Exhibition.

The South Metropolitan Gas Company in co-operation with the South Suburban Company had a most attractive stand at the recent South London Exhibition at the Crystal Palace. A very wide range of domestic gas and coke appliances was shown, while the lighting of the stand demonstrated very creditably what gas can do in this direction. Adjoining the gas exhibit was a model all-gas bungalow, equipped with every labour-saving gas appliance, and this attracted considerable attention during the Exhibition. [*See p.* 782.]

Coke Oven Gas Supply.

An account appears of a joint visit of the Yorkshire Junior Gas Association and the Manchester and District Junior Gas Association to the Thorncliffe Ironworks of Messrs. Newton, Chambers, & Co., Ltd. At a subsequent meeting Mr. Ralph Halkett, Junr., read a paper on "Coke Oven Gas Supply." [*See p.* 800.]

Holmes "Dri-Gas" Plant at Shrewsbury.

At a meeting of the Midland Junior Gas Association, Mr. R. L. Greaves, of Wolverhampton, read a thesis on the partial dehydration of town gas which gained for him the Diploma of the Institution of Gas Engineers. An extract is published to-day. The plant is situated at the outlet of the town holder. The author is convinced that the plant is simple, and readily controlled; that the partial dehydration of town gas at Shrewsbury is efficient, economical, and effective; that anticipated advantages and savings have been realized as far as the working to date can allow; and that the possible disadvantages have proved to be largely theoretical and practically of no consequence. [*See p.* 797.]

Formation of Cokes.

We publish to-day a report of the discussion on a paper on this subject by Mr. John Roberts, before the Institute of Fuel, an extract of which appeared in the "JOURNAL" last week. The Chairman at the meeting (Dr. E. W. Smith, C.B.E.) said that gas-works coke and coke-oven coke, if properly screened and graded and reasonably dried, and having a reasonably low ash content, can be used to advantage under many conditions, but is not yet as good as is necessary to effect its universal use. The gas and coke oven industries, by slightly modifying their conditions and—what is perhaps more important still—by developing a proper sales organization, can secure a financial return the extent of which has not yet been appreciated by them. [*See p.* 794.]

Remarkable Tests on Clean Coke.

Mr. H. C. Smith, of Tottenham, in his Presidential Address to the Southern Association of Gas Engineers and Managers, explains what his Company have recently done to produce a clean coke. A consignment of coal was treated by the cleaning process of Dr. R. Lessing. The clean coal was carbonized in Woodall-Duckham vertical retorts, and the resulting coke was compared with the coke made from similar slack but which had not been treated in the coal cleaning plant. The clean coke is harder, slightly denser, and considerably cleaner to the touch than that made from the raw coal, and is altogether a more attractive looking fuel. The reduction in the sulphur content "is sufficient to lessen considerably the unpleasant taste and smell which is apparent when a coke fire is burnt under a chimney with insufficient draught." The coke burns excellently in a coke-burning grate, such as the "Metro," and is an ideal fuel for a domestic boiler. [*See p.* 787.]

EDITORIAL NOTES

A Menace to Conciliation

APART altogether from any so-called merits or demerits of the particular case which may have brought about the result, there will be sincere regret on the part of all who have at heart the good cause of improved industrial relationships at the news from more than one important employment centre. Miners in Bristol actually struck against the award of an independent Arbitrator, which they had agreed to accept as binding; and the Miners' Federation of Great Britain, as many people will think somewhat unwisely, decided to make a grant to assist the men. Subsequently there arose a case of very much the same kind in the South Wales coalfield. There the men had been pressing for a vote upon the question of whether there should be a stoppage in protest against the terms of another award, by which, again, both owners and men had pledged themselves to abide. It was a decision by Mr. F. P. M. Schiller, K.C., the independent Arbitrator for the district, in connection with the fixation of the subsistence wage and minimum percentage to rule in the coalfield.

At a conference on Saturday, the South Wales miners' delegates rejected, by a very small majority, the proposal to strike; but whatever may be the direct outcome of such cases, the indirect result cannot fail to be the aiming of a severe blow at the policy of conciliation and arbitration in trade disputes—a policy which for many years past the "JOURNAL" has supported on every possible occasion. Hard words can do no good in circumstances like these; but it must be as clear as the sun at noonday that arbitration by which only one side will be bound is doomed to fall into disuse. "Heads I win, tails you lose," is a proposition which could appeal to nobody possessing even the faintest streak of business aptitude. On the contrary, conciliation, to be worth anything at all, must, as is the case with other things, be based upon good faith. The sound old citadel of British industry may be relied upon to repel all attacks from without, but if these attacks be from within, then who shall foretell the ultimate issue? In South Wales, the men's leaders were unanimous in advising acceptance of the award. That in tendering this advice they had to admit doubt of their ability to control their flock, was not the least unsatisfactory feature of the affair.

Clean Coke

A MOST interesting and highly valuable series of practical tests on the production of a clean coke is described by Mr. H. C. Smith, of Tottenham, in his Presidential Address to the Southern Association of Gas Engineers and Managers. These tests will, we hope, give a lead to others in the Gas Industry who, appreciative of the potentialities of high-temperature coke in both the industrial and domestic markets—particularly the latter—are doing their best to cultivate the satisfaction of the consumer. As in gas supply, so in coke supply, it is essential that uniformity of a good product should be maintained; and it is difficult to see how coke sales can be properly developed unless there is strict control of the ash content of the coal from which it is made, and of the moisture content of the smokeless fuel delivered into consumers' bins.

It would, we think, pay the Gas Industry handsomely to encourage the collieries to subject their coal to some cleaning process; and this encouragement can be fostered only through the pocket. Everything in Mr. Smith's address demonstrates the validity of this idea. A consignment of South Yorkshire slack was treated in Dr. Lessing's wet cleaning plant—a process which is familiar to our readers, and which possesses the extraordinary advantage that, although it is a wet cleaning process, the percentage of moisture in the cleaned coal remains practically the same as that of the untreated coal. In the case outlined by Mr. Smith, the moisture percentage of the original coal was 4·27, and of the clean coal 4·34. As for the ash, this was reduced from 11·08 p.ct. to 1·66 p.ct. The clean coal was carbonized in Woodall-Duckham vertical retorts, and the resulting coke was compared with coke made from similar slack but which had not been cleaned. Much more large coke was produced by the clean coal and much less breeze, but the most remarkable result was the great reduction of ash in the sizes which are supplied as domestic fuel. For example, the grade ½ in. to 1¼ in. contained: Coke from uncleaned coal, 16·19 p.ct. ash; from cleaned coal, 3·18 p.ct. The clean coke is harder, slightly denser, and cleaner to the touch than that made from the raw coal, and is a more attractive fuel; it contains much less sulphur (the reduction being from 1·55 p.ct. to 0·96 p.ct.), a matter of great importance in domestic use; it is an ideal fuel for a domestic boiler; and it burns excellently in a coke burning grate. In the address, a comparison is given of its performance in the open fire with that of a coke made from the unwashed slack and also of a sample made from "good South Yorkshire washed mixture."

But the benefits to the domestic consumer are not the only ones. Mr. Smith, as a result of the experiments he has made, has come to the conclusion that the output of a carburetted water gas plant would be increased by at least 20 p.ct. by using the clean fuel, and that the labour spent on clinkering would be largely reduced. And, of course, the gas-making capacity of coal gas plant would be greatly enhanced. The author has shown that it is possible to convert a dirty slack into a material from which a first-class coke can be made, and his arguments that this conversion should take place at the colliery and not at the gas-works are thoroughly sound. Mr. Smith has for many years devoted a great deal of attention to the manufacture of a satisfactory gas-works coke, to its preparation for the market, and to its effective distribution and sale, and it is fitting that in his address he should refer to the formation of the London and Counties Coke Association, which owes its initiation to the Eastern District of the Southern Association of Gas Engineers and Managers. We share Mr. Smith's hope that the new Association will do much towards improving the grading and quality of coke and the development of coke sales. In this, as in every other, respect we need co-operative action amply supported by individual effort.

On the matter of co-operation, Mr. Smith gives his views on the suggestions which have been made that the Associations of Gas Engineers and Managers should sink their identities and become District Sections of the Institution of Gas Engineers. He is obviously not in favour of such a course, though he reserves his opinion in regard to the Junior Associations. The latter present a different problem, and it might be to the advantage of the Industry if the Institution became responsible for their activities. We favour the idea if only because it would bring into line the membership qualifications demanded by the various Junior Associations.

More Evidence on Gas Drying

A CONSIDERABLE section of Mr. Smith's address is concerned with the results obtained by the installation of two Holmes "Dri-Gas" plants—one of a capacity of 16 million c.ft. a day, and the other of 3 millions. Both plants incorporate naphthalene washing. With the larger plant, the cost of the combined process of partial drying and washing for naphthalene works out at 0·034d. per therm, and with the smaller plant at 0·083d. But both these figures do not do full credit to the plant, for, so far, the 16 million unit has treated only 9·6 millions a day, and the smaller 1·24 millions; and, therefore, the

costs quoted will be reduced as the load on the plant increases. The main point to bear in mind is that the annual cost of partially drying and ridding of naphthalene the total gas output of the Tottenham and District Gas Company is more than offset by the reduced expenditure on clearing consumers' services, on clearing public lamp services, on paraffin formerly used for spraying, and on syphon pumping. The second point to remember is that the "Dri-Gas" and naphthalene washing plant was "installed not to lessen costs of manufacture, but to afford to consumers an additional service." There is no doubt that gas drying results in better service to the consumer.

Also, one must look to the future. We will quote Mr. Smith: "I believe that in the course of a year or two our troubles from stopped services will cease entirely, in which event we shall benefit by a still further reduction in costs. . . . I believe that when the dry rust is entirely removed there will be no stoppages at all on the public lamps, and as these cost 1s. 3d. per service to clear it is fair to credit the new process with (say) 1s. 3d. per service in respect of 2000 services—a total of £125 per annum." This question of rust removal is dealt with fairly fully by Mr. Smith, and he points out that the dry powdering rust now found is quite easy to handle. This fact has rendered possible the almost general application of a simple suction plant, devised and constructed for clearing services by Mr. R. J. Wilson, Mechanical Engineer at the Willoughby Lane Works of the Tottenham Company, instead of a force pump. Not only does the suction plant remove the rust entirely from the system, instead of blowing it back into the mains, whence it is likely to find its way into another service, but it saves money. Whereas with the force pump it cost, on an average, 2s. 9d. to clear a service, the cost with the suction plant is only 1s. 3d.

As vindication—if, indeed, further vindication be necessary—of the desirability of drying gas, we quote the following significant passage from Mr. Smith's admirable address: "We aim at 100 p.ct. freedom from breakdown in supply, and generally we are successful. Such failures as there are are infrequent and occur in isolated services not affecting whole districts. They are due to the deposition of naphthalene, water, and rust, all of which can now be removed successfully. Any failure due to one of these causes gives some notice, and if it is reported soon enough can be dealt with before the stoppage is complete. The reliability of gas supply is one of its great assets, and any process which assists in maintaining or improving this reliability is worthy of the closest consideration."

Rating and Bulk Supplies

In our editorial columns on Jan. 14 last we commented on the appeal of the Manchester Water-Works Undertaking from the decision of the Recorder of Bolton as to the rateability of indirectly productive works, which, it was claimed by the Assessment Committee, were rendered directly productive and of increased value by reason of the supplying of water in bulk to a neighbouring Local Authority. It was pointed out that, in view of the increasing tendency for bulk supplies of gas to be taken and delivered by a number of undertakings throughout the country, the ruling of the High Court was important. It is of interest to note, therefore, that at the recent meeting of the Lancashire County Valuation Committee at Preston, the County Valuer (Major Harry Barnes) reported that the Bolton Assessment Committee had decided not to proceed further with the appeal against the decision of the King's Bench Division in the case of the Manchester Corporation Water-Works, but had adopted a report on the case from which the following is an extract:

> In view of the fact that the whole of the undertaking is to be re-valued by the Panel of Valuers as arranged with the County Valuation Committee, we did not consider that we were justified in expending the funds of the Committee in further litigation . . . but we suggest (to the County Valuation Committee for the use of the Panel of Valuers in making their joint valuation of the whole Manchester Water-Works Undertaking from Thirlmere to Manchester) . . . that in the distribution of the ascertained rateable value—in accordance with the "Kingston case" (*Kingston Union Assessment Committee v. Metropolitan Water Board*, 1926; *A.C.* 331)—of the profits from "directly productive works," the question of the inclusion of those profits accruing in the townships where there are bulk supplies delivered being taken into account in such distribution should be further considered, as being in the nature of special circumstances coming within the terms of the Kingston case, and, instead of claiming additional value for what has been termed "dead" works, that, in the decision of the assessment of the "directly productive works," there should be apportioned the profits from bulk supplies to each parish in which they arise, *but so as not to increase the total beyond the rateable value of* the whole undertaking.

It is evident, therefore, that this particular aspect of rating may again come before the Courts for review. From the viewpoint of public utility undertakings, we suggest that the manner in which the total rateable value is apportioned among the various Local Authorities matters little (assuming that the rates levied in each area are approximately the same) so long as the import of the words in the report which we have italicized is recognized and appreciated.

In the course of his lengthy judgment, Mr. Justice Avory laid particular emphasis on the point, which we suggest cannot be too often repeated or too strongly impressed upon the Rating Authorities, that (as Wightman, J., remarked in *R. v. West Middlesex Water-Works*, 1859) the Court is bound to protect the occupier from being rated beyond the rateable value of the whole undertaking. It will be remembered that this principle, and the possibility of deviation therefrom, formed part of the case presented to the Central Valuation Committee last year by the representatives of the public utility interests, and we are pleased to note that this aspect will not be overlooked in considering the question of bulk supplies.

More About Coke

Last week we published an extract from a paper on the formation of cokes by Mr. John Roberts, whose name and work will be familiar to our readers; to-day an extensive report of the discussion to which this paper gave rise—it was read to the Institute of Fuel—will be found on later pages. From the Gas Industry's point of view, perhaps the most interesting part of his contribution is his reference to the experiments on the manufacture of a free-burning high-temperature coke which he carried out at the Ramsgate Gas-Works in conjunction with the Woodall-Duckham Company. In these experiments, intermittent vertical retorts were employed, and instead of using "straight" coking coals blends of coking and non-coking coals were used. The temperatures in the flues reached 1350° to 1370° C. The use of these non-swelling blends facilitated the penetration of heat through the charges, and enabled the retorts to be discharged in two-thirds of the normal coking time. The result was the production of a high-temperature coke having remarkable free-burning qualities, and one that could be kindled in the usual way in an ordinary open grate. The volatile content was about 4 p.ct. The system consists in carefully blending the strongly-coking coals with non-coking or high-oxygen coals, and carbonizing at the highest available flue temperature until the middle of the charge reaches a temperature of about 550° C. The coke is then discharged, cooled, and graded. Any breeze below ¼ in. that is produced can be returned to the retort, replacing an equal weight of non-coking coal, so that the whole of the coke made may be marketable. We have examined the coke and believe that the author's claims are well justified.

The point which we emphasize is that the high-temperature carbonizing process is suitable for producing cokes in every respect capable of satisfying the requirements of the domestic consumer, who is bound to become more and more interested in the use of smokeless fuels. We are in thorough agreement with Dr. E. W. Smith in his statement that gas-works and coke-oven coke, if properly screened and graded and reasonably dried, and having a reasonably low ash content, can be used to advantage under many conditions, but is not yet as good as is necessary to effect its universal use. The gas and coke oven industries, by slightly modifying

their conditions and—what is perhaps more important still—by developing a proper sales organization, can secure a financial return the extent of which has not yet been appreciated. Mr. F. Puening (the Koppers Company) put forward the view that the sale of coke depends, not upon its price, but upon its quality. If all the high-temperature cokes available were good enough, he said, there would be no trouble whatever in selling them. His Company sell every day about 12,000 tons of high-temperature coke made in their plants, and it is sold by reason of its quality. They could sell any coke, provided the ash content was sufficiently low and of the proper fusibility. It is his experience that, if the coke is satisfactory and does not give trouble, the average householder is willing to pay any price within reason, even though that price may be 10s. or 15s. per ton higher than that of coal. This is a point well worth noting. Let us do our best to produce a low-ash coke, and as Mr. E. G. Stewart, of the Gas Light and Coke Company, stressed, let us maintain uniformity of quality in our supplies to consumers—a phase of the subject of coke sales to which we have drawn attention many times in these columns. If this policy is adopted, there can be no doubt about the good results which will accrue. It is not a question of talking about a theoretical ideal; it is simply sound business.

PERSONAL

The Directors of the Plymouth and Stonehouse Gas Light and Coke Company have unanimously elected Mr. P. S. HOYTE, M.Inst.C.E., M.I.Mech.E., to a seat on the Board, to fill the vacancy caused by the death of the late Admiral Maurice Woollcombe, C.B. Mr. Hoyte was the Chief Engineer of the Company for nearly thirty years, and on his retirement from that position in November, 1923, was appointed as the Company's Consulting Engineer.

Mr. A. G. READDY'S appointment as Manager of the Gas and Water Undertakings of the Hoylake and West Kirby Urban District Council in 1925, after 39 years with the then Company (19 years as Secretary and 20 years as Secretary and Manager)—making a total of over 44 years' connection with these Undertakings—expires on March 31. The following appointments have been made: Mr. R. ROBERTS, as Water Engineer and Superintendent of the Gas and Water Mains and Services; Mr. F. B. WILLIAMS, as Gas-Works Engineer.

Mr. C. E. BYRT, Works Manager under Mr. J. H. Clegg, Engineer and Manager of the Burnley Corporation Gas Department, has been successful in obtaining the appointment of Engineer and Manager of the Gainsborough Urban District Council Gas Department. Mr. Byrt received his early training with the Bath Gas Company, and for a time occupied the position of Assistant Engineer and Manager to the Colombo Gas Company. On his return to England he was appointed Engineering Draughtsman at Burnley in 1924, and was subsequently engaged as Works Manager at the old works at Parker Lane. On the completion of the new works at Oswald Street, he was appointed Works Manager.

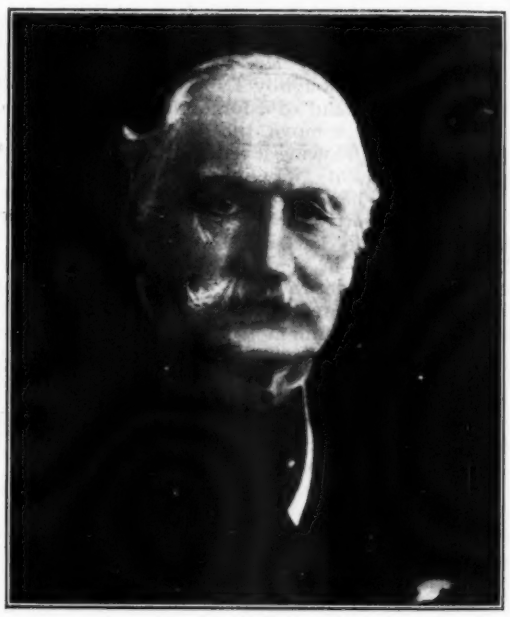
Mr. R. J. RESTALL, Engineering Assistant with the Burnley Corporation Gas Department, has been recommended to the Council, by the Gas Committee, as Mr. Byrt's successor. Prior to commencing duties at Burnley, Mr. Restall was engaged with the Stretford and District Gas Board and the Stockport Gas Department.

The wedding took place on March 19, at Holy Trinity Church, Halifax, of Mr. JOHN DRAKE, the eldest son of Mrs. Drake and the late Mr. William A. Drake, of Dalemore, to Miss Yvonne Metcalfe, the only daughter of Mr. and Mrs. Percy William Metcalfe, of Kirby Leas, Halifax. Mr. John Drake who has recently been elected to the Board of Messrs. Drakes Limited, of Halifax, Constructional Engineers, is the great-grandson of the late Mr. Jonas Drake, the founder of the business, and grandson of the late Mr. John Armitage Drake, who was the first Chairman and Managing Director, and remained at the head of the business from the date of its incorporation up to the time of his death in 1913. The bridegroom is the eldest son of the late Mr. William A. Drake, brother of the present Chairman, Mr. J. Wilfrid Drake. His father was Chairman and Managing Director from 1913 to 1921. The future residence of the bride and bridegroom will be at 4, Norton Towers, Halifax.

OBITUARY

SIDNEY FLAVEL.

The death occurred of Mr. Sidney Flavel, Chairman of Messrs. Sidney Flavel & Co., Ltd., on March 16. Mr. Flavel, aged 84, was the great grandson of the founder, and started his career with this family concern in 1867. Deceased devoted a great portion of his life to public affairs,



he was Mayor six times, appointed Justice of the Peace in 1876, Alderman in 1884, and Hon. Freeman in 1910 of the Borough of Royal Leamington Spa, Justice of the Peace in 1896, and Alderman in 1889 of the County of Warwick. His son and grandson will carry on the firm.

Extreme simplicity, in accordance with his expressed wishes, marked the funeral of Mr. JOSHUA MACER WRIGHT, J.P., Chairman of the Hastings and St. Leonards Gas Company, on March 21, at the Borough Cemetery.

The death has occurred of Mr. ERNEST WILLIAM OBORNE, who joined the Torbay Paint Company. Ltd., in 1923 as Civil Engineer, and ultimately became a Director of the firm. The funeral took place at Southampton on March 17, among those present being Mr. S. Freeman Burrows (Managing Director of the Torbay Paint Company), Mr. Henry L. P. Allender and Mr. G. Arthur Stevens (Directors).

FORTHCOMING ENGAGEMENTS

March 26.—B.C.G.A. YORKSHIRE DISTRICT CONFERENCE at Halifax.—Alderman J. H. Waddington, J.P., presiding.

April 10.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Spring Meeting at Falkirk.

May 14 and 15.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring Meeting at Wisbech.

May 21.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION.—Meeting at Cardiff.

May 22.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting in London, under the Presidency of the Right Hon. Lord Eustace Percy, M.P.

June 2-4.—INSTITUTION OF GAS ENGINEERS.—London Conference.

June 30.—NATIONAL GAS COUNCIL.—Thirteenth Annual General Meeting.

Oct. 27-28.—INSTITUTION OF GAS ENGINEERS.—Autumnal Research Meeting.

GAS SERVICE - - -

Discussed from the viewpoint of the Gas Salesman.

A *Definition.*

Salesmanship is a word that is on a good many lips at the present day, and just because it is so fashionable it is as well to pause and think what we mean by salesmanship when we talk so glibly about it, and beware lest we turn it into a catchword and lose sight of its real significance. These wise words were spoken by Miss Dorothea W. S. Webber, who is a Lecturer to the Regent Street Polytechnic, in a recent address to the Faculty of Teachers in Commerce. They were followed by what is really an admirable definition, in which she said that salesmanship consists in making your prospects think as you want them to think and act as you want them to act, while all the time wanting them to think and to act in a way that will be profitable to them as well as to you. Of course, the real essence, which distinguishes genuine salesmanship from the old idea of " selling a pup if you can," is in the last clause —to them as well as to you. Gas salesmen generally have such a good proposition to put that they need have no difficulty in this respect.

Radiants are not "Fuel."

In the interests of accuracy, and to avoid any impairing of what has been described as the Industry's best slogan, Mr. D. R. Tennant, of the gas-fire radiant firm, has raised this point in a letter to the March " Gas Salesman " as follows: It has been impressed upon me more and more, during my association with the Gas Industry, and particularly while at the British Industries Fair, that, even in these enlightened days, there are a great many people who still refer to gas fire radiants as " fuel "—despite numerous notices to the effect that " *GAS* is the Fuel of the Future."

Bearing in mind the fact that fuel is " something which is consumed," let us take an analogy in a slightly different, though similar, sphere. One would not, for instance, refer to a carburettor or a sparking-plug as fuel, but these help to convert petrol fuel into heat-energy, just as an injector burner and radiant do their share in turning gas fuel into heat in the fire.

Granted, this in itself may not be a big point, but surely it is up to everyone interested in the Gas Industry to keep up to date, not only in methods of gas sales and service, but also in gas terminology, and especially to keep it as clear as possible. It is important that we should help, and not confuse, the general public, particularly in view of the keen competition of electricity, which is certainly doing its best to make it easy for the public to obtain its services.

I think this matter of easily understandable terms is of great importance. Would it be asking too much of the Industry in general to refer, in future, to these articles only as " Radiants," *not* " Fuel "?

When the Wife's Away.

This is the theme of this month's showroom window article in the " Gas Salesman " by Mr. Easten Lee. Two illustrations show the " first week-end " and the " second week-end." In the first the mere man, left to struggle with the old-fashioned coal range, wears a very worried look amid the chaos of trying to get it alight, and the prospects of a meal appear extremely remote. He declares that he will settle all this by Monday. The picture of the second week-end, shown if possible in an adjacent window, can be imagined. A gas fire, with neat art-metal surround, hides the vault where the old range stood, and, in the corner of the now very orderly kitchen, stands a gas cooker with father obviously enjoying the preparation of his food.

This is a very effective and comparatively easily staged lay-out, designed to show how intolerant many men would be if they had to work at home with old-fashioned and out-of-date appliances which they would not for one moment countenance in their works and offices. Gas undertakings which have room for it, and like crowds round their windows, might well try it. It is just the sort for this.

Co-Operation between Small Undertakings.

A fortnight ago in these notes we referred, in connection with a paper by Mr. C. A. Masterman to the London Circle, to the idea of a co-operative Central Laboratory. Since then, the case of the smaller undertakings has been pleaded by Mr. David Muir, Engineer, Secretary, and Manager at Pontypridd, who, by the way, recently gave up the Chairmanship of the South Wales and Monmouthshire Circle after six years' consecutive service. In the course of an address to the members, he said: " To-day, especially in the larger undertakings, there is a trained staff of salesmen both on the domestic and industrial sides, with well-equipped showrooms where demonstrations may be given and laboratories where tests may be carried out to solve the problems that arise between consumer and salesman. The lot of the smaller undertakings is not so happy, and in quite a number of cases the old order still exists. Can anything be done to assist them in the fight? Is it not possible for a number of the smaller undertakings in an area to co-operate and have the services of trained salesmen and, if need be, establish a Central Laboratory? In our area we know that the Cardiff Gas Light and Coke Company only too willingly place their laboratory and staff at the disposal of any other undertaking in order to render assistance. We know also that the manufacturers of appliances have risen to the occasion and carry staffs of skilled technicians who are constantly exploring all avenues for further improvement. What is needed, however, is a closer working relationship between these investigators and the staffs of gas undertakings who are daily up against the problems. On occasions when lecturers from various firms have appeared before our Circle they have returned to their respective headquarters with food for reflection."

Difficulties, but not Insuperable.

Our own views on the value of a national laboratory for the Gas Industry have been expressed before, and we have yet to find adequate reason why we should alter them. There are grave difficulties facing the launching of such an enterprise, but our Industry ought to be strong enough to overcome them, and institute a central laboratory which will be able to speak for the Industry as distinct from any one undertaking. It can hardly be said that the idea is novel. Such laboratories are already in being in the United States, in Canada, in Australia, and in France. And it is now twenty years since the idea was broached in the " GAS JOURNAL." In October, 1911, Mr. R. J. Rogers, of the Birmingham Gas Department, put forward an excellent case for the establishment of a national testing laboratory in this country. " With the daily increasing number of appliances of all descriptions," he said, " it is almost impossible for the small or medium-sized undertakings to carry out tests of all these appliances under conditions such as they would desire. Besides, there is necessarily a considerable repetition of tests of the same apparatus made by various gas undertakings." The need existed in 1911; developments since then have greatly increased this need.

A Safeguard for the Public.

We advocate a central body for the standardization of tests of appliances and, if desirable, the institution of research. The knowledge obtained by such an organization should be at the disposal of every undertaking in the country, and the smallest concern in the land should be at liberty to submit for test any particular type of appliance. Its inauguration should not—and this is extremely important—in the slightest degree diminish the value of work undertaken by individual gas undertakings, or in any way render special work by these undertakings unnecessary. For example, gas concerns in industrial areas would not lessen present endeavours or cease to undertake particular investigations applicable to the fields for which they have to cater and which they have to develop. Its inauguration ought, on the other hand, to result in a better general service to the Industry as a whole, and should eliminate much unnecessary work. Incidentally, we have no doubt that the public's sympathy towards gas usage would be more readily kindled if approved apparatus bore some " sign of merit." Also, we do not for a moment think that a national testing laboratory would act as a brake on the efforts of the gas appliance manufacturers.

What the Circles are Discussing.

The papers by Mr. Masterman and Mr. Muir, referred to above, are reported in full in the March " Gas Salesman." There are other examples in that issue of the valuable material which nowadays is forthcoming from the Salesmen's Circles. Mr. F. H. Arms, of Birmingham, addressed the Midlands District Circle on " Gas Coke as a Domestic Fuel," emphasizing the importance to gas undertakings of the satisfactory disposal of their main bye-product, and

suggesting ways in which gas salesmen, who came into daily contact with the public, can further this aim. Mr. J. Hill, of Bournemouth, chose for a recent meeting of the Southern District Circle, Sub-section B, the important topic of " Central Heating by Gas."

Bafflers—Good and Indifferent.

The fundamental principles of bafflers are being considered by " Thermix " in a series of articles in the " Gas Salesman." In the March issue the author deals with bafflers of both the cage and the drum type. " An important part of the flue equipment," he says, " is the secondary fluepipe; and the vertical height of this should be as great as possible. The thing to bear in mind is that the baffler constitutes a complete break in the continuity of the flue. Assuming that there is sufficient primary fluepipe to offset the resistance of the baffler and so to ensure perfect combustion, then it is the secondary fluepipe which extracts the products of complete combustion, together with air from the room, and which discharges them into the outside atmosphere. Obviously the greater the vertical height of the secondary fluepipe, the better will be the efficacy of the ventilating equipment."

THE NEWS OF THE WEEK

The Abertillery Gas Department reports an increase of 2,600,000 c.ft. of gas during the past three months, over the corresponding period of last year. It has been decided to supply and fix a fourth light free of charge to all slot meter consumers.

The Supply of Electricity failed at York on Saturday night, and for approximately 1½ hours, from 7 to 8.30 p.m., many establishments in the centre of the city were entirely without light. It is understood that the trouble was due to a breakdown in connection with the A.C. supply.

The Birmingham Corporation Gas Department are responsible for an exceptionally fine display of gas fires, cookers, and lighting equipment at the National Trades Exhibition at Bingley Hall, Birmingham (which was inaugurated last week by the Lord Mayor of that city). The stand, which is a most attractive display of colour and lighting, stresses the note of hygiene and saving of labour.

The Board of Trade announce that in pursuance of Section 7 of the Merchandise Marks Act, 1926, a Draft Order in Council has been laid before Parliament requiring the following descriptions of imported goods to bear an indication of origin on sale or exposure for sale in the United Kingdom: (1) Air or gas compressors or exhausters worked by mechanical power; (2) pneumatic tools or appliances operated by means of air or gas compressors or exhausters of the types referred to above.

Analyses of Municipal Gas Accounts.—Messrs. Ernest Benn, Ltd., have published the 1929-30 " Gas World " Analyses of Municipal Gas Accounts, at 21s. net. Sixty-six municipal undertakings are dealt with, and particulars are given of the coal carbonized and oil used; percentage of water gas; gas made, sold, and unaccounted-for; yield of residuals; gas and meter rental; revenue from residuals; manufacturing charges; rates; distribution charges; management charges; bad debts; net cost of gas; gross profit; capital and capital charges; mileage of mains; consumers, public lamps, cookers; and the declared calorific value of the gas supplied.

Gas Profits to Reduce Rates.—At a meeting of the Bingley Urban District Council, on March 16, Mr. Tom Snowden, M.P. (Chairman of the Lighting Committee), opposed a proposed reduction of 1s. 6d. in the £ in the rates for the coming year on the ground that the reduction was only possible by utilizing profits of the Gas and Public Lighting Department, the estimate for which in respect of the coming year was equivalent to a 2d. rate. Mr. Snowden said he had been consistently opposed to rates being subsidized out of profits from Departments which needed the money for their own development. If there was sufficient excess profit from the Gas Department to enable money to be taken for relief of rates, that money would be better expended in giving relief to the poorer people among the gas consumers. Mr. Snowden moved an amendment that the proposed rates be sufficiently increased to allow the Gas Department's contribution to be withheld. The amendment was defeated and the rating proposals were approved.

Gibbons (Dudley), Ltd., of Dibdale Works, near Dudley, show a net profit for the year, after providing for depreciation, of £7680, which, added to the amount brought forward from last year, £10,653, makes a total of £18,333. From this amount the following dividends have already been paid: The full 7 p.ct. preference dividend, free of income-tax, for the year; and the interim dividend on the ordinary shares of 3½ p.ct., *less* income-tax. The Directors recommend the following allocation of the balance: To pay a final dividend on the ordinary shares of 2½ p.ct., *less* income-tax, making, with the interim dividend already paid, 6 p.ct. for the year, which after the payment of further Directors' fees leaves £9564 to be carried forward to next year.

Gas in Industry.

Demonstrations of Heat-Treatment Processes.

Demonstrations of heat-treatment processes were given on March 18, before representatives of many industrial concerns, in the new research premises which the Smethwick Corporation Gas Department have provided in Crocketts Lane as part of their scheme of development.

Mr. Ernest Hardiker, the Manager of Smethwick's Gas Undertaking, mentioned that the local Department, in co-operation with the Birmingham Gas Department, were offering consumers every facility for assistance in their heat-treatment processes.

Dr. C. M. Walter, the Engineer-in-Charge of the Industrial Research Laboratories of the Birmingham Gas Department, pointed out that the advance in the automobile industry was practically dependent on the special properties that could be imparted to steel by scientific heat treatment. This also applied to certain aluminium alloys now largely used in aircraft.

Leeds University Fuel Department.

Every year the Department of Coal Gas and Fuel Industries of the Leeds University arrange a delightful informal dinner which enables old students to meet newcomers into the ranks of the Department—which is synonymous with saying newcomers into our Industry—to exchange views on current events, and to have a chat with Prof. Cobb and their former tutors.

The guest of the evening at the function this year, which was held on Friday last, was Mr. A. G. HEBDEN, of the South Yorkshire Chemical Company. In a happy speech proposing the toast of the Fuel Department—the only toast of the evening—Mr. Hebden remarked that old students of Leeds University were scattered all over the world and had taken, were taking, and in the future would take, their part in the shaping of the Gas Industry in this country and the Empire. There had, he said, been quite a lot of discussion and controversy lately between two great sister industries—

the older being the Gas Industry and its younger sister the Coking Industry. It had been said on many occasions that openings for fuel technicians in the Coking Industry were very few and far between, and that, since there were only a few coke oven managers in the country, one might have to wait years until a coke oven manager died before one could have the opportunity of filling such a position. "I would like to state here," observed Mr. Hebden, "that in my opinion the Coking Industry at the present time is absolutely in its infancy, and the need for the highly-trained fuel technician in this industry is great, and the openings for the right type of men in the future are many. Further, I think I am right in saying that the carbonization of coal in bulk in coke ovens for the production of coke and gas will gradually supersede the present methods of small units at gas-works."

Mr. J. W. WOOD and Mr. H. J. HODSMAN replied on behalf of the Staff of the Fuel Department. For the old students, Mr. NORMAN S. SMITH ("GAS JOURNAL") responded, while the reply on behalf of present students in the Department was in the hands of Mr. A. T. BLAKELEY.

New Specification for Road Tar.

The British Engineering Standards Association has just published a further specification for road tar, designated "Tar No. 3." This specification, the draft of which was prepared by the British Road Tar Association, provides for a tar suitable for the manufacture of tarmacadam laid by the hot or semi-hot process, as an alternative to Tar No. 2, contained in B.S. Specification No. 76—1930, and its viscosity is higher than that of this latter tar. The methods of testing and specifications for apparatus which are given as appendices have been prepared by the Standardization of Tar Products Tests Committee, and are based on this Committee's publication "Standard Methods for Testing Tar and its Products."

Copies of the new specification (No. 76, Part 2—1931) may be obtained from the British Engineering Standards Association, Publications Department, 28, Victoria Street, London, S.W. 1, price 2s. 2d., post free.

Identification Colours for Gas Cylinders.

The British Engineering Standards Association have just issued a British Standard Specification for Identification Colours for Gas Cylinders. This specification provides for identification colours for gas cylinders for gases most commonly in use, the underlying principle of the scheme being that yellow should represent toxic or poisonous gases, and red, or maroon, inflammable gases. For example, hydrogen and coal gas cylinders are to be coloured red, while chlorine cylinders are to be coloured yellow. The colour of cylinders for carbon monoxide—an inflammable and a very poisonous gas—is a yellow ground with a red band.

The Committee responsible for the preparation of the schedule has recognized that there are other gases used in limited quantities for which a colour has not yet been allocated and they point out that it is important that the colours so far adopted should not be used for gases other than those indicated.

Copies of this Specification (No. 349—1931) can be obtained from the Publications Department, British Engineering Standards Association. 28, Victoria Street, London, S.W. 1, price 2s. 2d. each, post free.

British Standard Specification for Valve Fittings.

The British Engineering Standards Association have just issued a British Standard Specification for Valve Fittings for Compressed Gas Cylinders. This specification provides for valve fittings for compression gas cylinders for practically all the gases in general use, and requirements have been included for a safety release for carbon dioxide cylinders.

Particulars are given in an Appendix to the specification of inspection gauges for checking the threads on the valves and the threads in the cylinder necks, and the National Physical Laboratory are the custodians of the standard gauges so that the working gauges necessary for the production of cylinders and valves can be checked at a reasonable cost.

Copies of this Specification (No. 341—1931) can be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W. 1, price 2s. 2d. each, post free.

Visit of the British Association to South Africa.

At the Mount Pleasant Lecture Hall, Hastings, there was recently given by Mr. Walter Dunn, M.I.Mech.E., a lecture describing his experiences in attending the meeting of the British Association in South Africa. Taking for his title "With the 1929 British Asses in South Africa," the lecturer recounted incidents of the voyage by "The Windsor Castle" (R.M.S. of the Union Castle Line) from Southampton to Cape Town. The President, Sir Thomas Holland, F.R.S., and the late Sir Charles Parsons, O.M., the Sultan of Zanzibar and his son, and Dr. Haldane (one of the three Metropolitan Gas Referees) were included among the passengers.

An excellent set of lantern slides illustrated the lecture, at which Capt. Isles presided. The audience were taken through the salient features of the Cape; Kimberley, with its diamond fields, where the members were the guests of De Beers Consolidated Mines, Ltd.; Johannesburg, with its wonderful gold mine workings, the Premier Mine of which was descended; Pretoria, where were visited the recently completed Administrative Headquarters of the Government of the Union; Pietermaritzburg, the garden city of Natal; and Durban, in the Bay of which the visitors were taken for an excursion, including the famous whale fishery depôt.

The Earl of Athlone and the Countess received the members during their stay in the Union, and Mr. Hertzog and General Smuts also offered welcome. Brilliant evening receptions were held at the respective City Halls of Cape Town and Johannesburg, and an afternoon reception was given by the Municipality of Durban. Some of the members made their way to the magnificent Victoria Falls of the Zambesi, and those able to do so returned to England by the east coast, calling at Zanzibar, where they were the guests of the Sultan. They proceeded through the Suez Canal and the Mediterranean.

The present year will mark the Centenary of the Association, which will be fittingly celebrated in London next September, under the Presidency of General Smuts. During the meeting opportunity will be given for an inspection of the exhibits of the Faraday Centenary Exhibition at the Albert Hall.

It will be of interest to readers of the "JOURNAL" to have reproduced the Association's Totem Pole, which was designed by Sir Richard Paget, and explains clearly the colloquial assignation of "British Ass," by which each member of the Association is known.

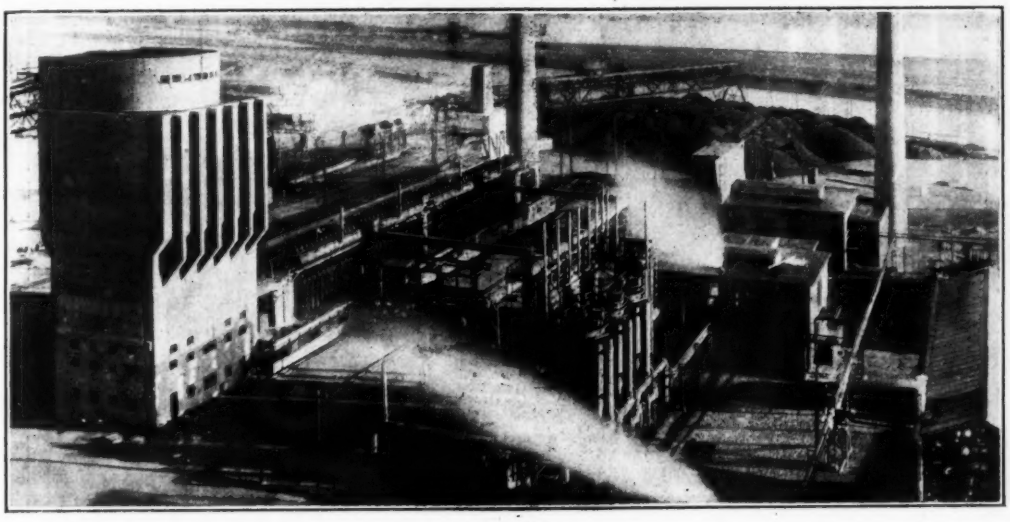
The Pole bears at the top the head of the British Ass, with Union Jack on his forehead, and scales, symbolizing impartial and accurate weighing of evidence, in his teeth. Below come the different sections in alphabetical order, the Section in which the Gas Industry is associated being Section B—Chemistry.

Section A represents the sun and stars (with light bent in passing the sun). This denotes Astronomy in particular and Physics in general; below are mathematical symbols π composed of logs, and ∇) and cube roots growing out of the ground.

Section B has two crossed retorts (courteous) and a row of test tubes for Chemistry. Section C has a geologist with hammer and ammonite. Section D is Zoology, with bird, beast, and fish. Section E (Geography) shows a globe round which two hands come exchanging wheat for a wheel (manufacturers), to represent Foreign Trade, with which, among other things, Section F (Economics) is concerned. A dollar bag and a scroll with curves complete the representation of Section F, which rests appro-

NEW COKE OVENS AT MAGDEBURG

Large German Gas-Works Adopts Hinselmann Compound Oven



GENERAL VIEW.

The Town of Magdeburg, Germany, have recently put into commission a battery of sixty Hinselmann compound ovens, following a survey of the position as to the most economical methods of producing gas. The period occupied in the completion of the whole works was rather less than twelve months, which speaks well for the Contractors' organization and the Gas Engineer's plans.

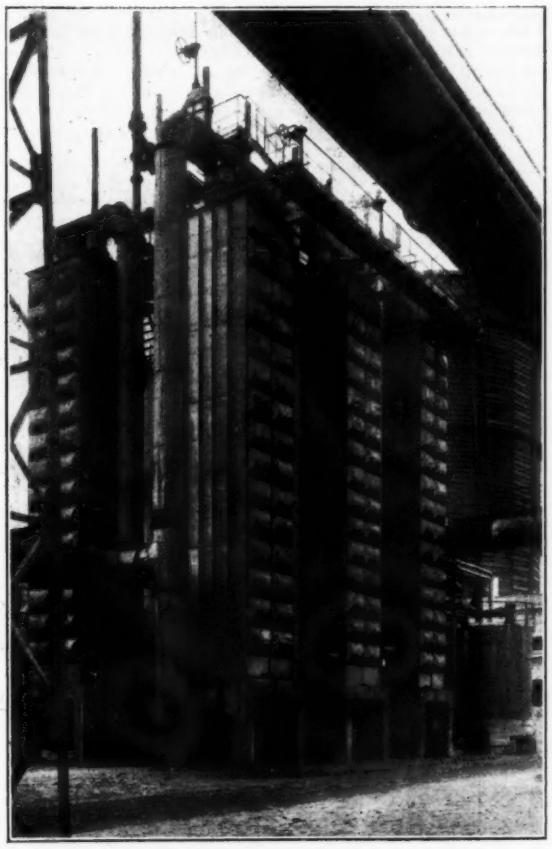
Coal for the works is either water borne or arrives by rail. Vessels are unloaded by means of a travelling bridge crane, while wagons are discharged by wagon tippler. An electric telpher system conveys the coal from the discharging point either directly to a 3000-ton bunker with which the ovens are equipped, or to the storage area, which is likewise served by means of a bridge crane of nearly 250 ft. span. The whole installation was built in accordance with the system and patents of the Hinselmann Koksofenbaugesellschaft m.b.H., of Essen, whose representatives in the British Empire are Messrs. Donald Bagley, Ltd., of 124, Victoria Street, Westminster, S.W. 1.

The battery consists of sixty under-burner ovens in which, in contra-distinction to other systems, the regulation and control is arranged directly beneath the ovens in a special chamber in which the whole of the gas and air regulating valves are placed; thus, each individual heating flue can be regulated as to both air and gas supply, permitting the highest economy in heating the gas. The ovens are arranged for heating by either coke oven gas or producer gas. The oven chambers are 13 m. in length by 4 m. in height, and the capacity is equivalent to approximately 15·6 tons of dry coal. The total throughput amounts to 910 tons of dry coal per 24 hours, but by forced heating with a reduction in the carbonizing period the throughput can be raised to 1250 tons per 24 hours, when the annual capacity is approximately 450,000 tons.

With the battery fired by oven gas, the annual surplus for the public service is between 2600 and 2800 million c.ft.; this corresponds to an output of 255,000 tons of coke per annum, which can be increased to 350,000 tons by forced heating. The whole installation is so arranged that it can be duplicated economically.

An electrically driven coal charging wagon is provided for filling the ovens, this being automatically fed from the oven bunker. Coke is discharged from the ovens by an electrically driven ram directly on to the quenching car, which is designed for accommodating the full charge from one oven. The coke ram weighs about 123 tons, powered by a series of electric motors of a total 240 H.P. The self-sealing doors with which the ovens are equipped are withdrawn or closed by special equipment.

The quenching plant consists of a reinforced tower in which are arranged a number of water sprays. An electric locomotive moves the coke quenching car under the tower, where the hot coke, which is discharged at a temperature of 900° C., is cooled. The quenching car is then withdrawn by means of the locomotive, and the contents are discharged on to an inclined bench, where the coke is cooled and then gravitates to a belt conveyor which transports it to the screening plant. A grizzly is interposed at the end of the belt, and the large coke is delivered



Condenser Plant.

THE NEWS—*continued.*

priately on the bridge and ship constructed by Section G (Engineering).

The anthropologist in Section H studies himself in a mirror, while Section I (Physiology) studies the body (the human heart), for which it has microscopes. Section J Psychology) is shown here studying a dream, and Section K (Botany) is represented by trees and flowers. Section L (Education) is deep in a book; while Section M (Agriculture) unconsciously supports the whole.

The British Ass bears on his head the traditional cap with the rings of honour.

Dundee Municipal Inquiry.

Administration of Gas Department.

On Friday last the Lord Provost's Committee of the Dundee Town Council considered the findings of Mr. Charles Mackintosh, Advocate, of Edinburgh, who recently conducted on behalf of the Committee an inquiry into the administration of the Corporation Gas Department, particularly with reference to the subsidence of a new gasholder at Lochee—see "JOURNAL" for March 11, p. 658. At the inquiry evidence was given by Mr. James Dickson, Gas Manager and Engineer; Mr. Laurence A. Hislop, Assistant Gas Manager; and Mr. Peter Low, a former member of the staff and now Gas Manager at Elgin. The following is an extract from the "Glasgow Herald" for March 21:

Mr. Mackintosh, in the course of his findings, said that the officials of the Gas Department came to the decision to dispense with piles on the site without making sufficient investigation and inquiry as to whether it was safe to do so, and without making any effective use of the valuable expressions of opinion which had been placed at their disposal by some of the highly expert firms who had tendered for the work.

"ERROR OF JUDGMENT."

There was, in his opinion, both error of judment and a certain degree of carelessness on the part of the senior officials of the Gas Department. For this Mr. Dickson, as the responsible head of the Department, must to some extent be held to blame, while he was, in his (Mr. Mackintosh's) opinion, extremely badly served in this matter by Mr. Hislop, the head of his technical department.

Mr. Hislop was aware from the start of all the warnings that the contractors had given regarding the site, and if this information, or even part of it, had been passed on to Mr. Dickson, he (Mr. Mackintosh) thought that Mr. Dickson would never have undertaken the responsibility of erecting the gasholder on an unpiled foundation. It was his duty, when consulted on this topic, to lay before his Chief all relevant information which he himself possessed, and his failure to pass on the contractors' warnings was a gross dereliction of duty on his behalf, and was in no way excused by the fact that if Mr. Dickson had been more active personally, and less reliant on his staff for information, he might have got the information himself.

"MISLEADING" STATEMENTS.

Referring to letters written by Mr. Hislop to Mr. Low and members of the Gas Department after the subsidence, Mr. Mackintosh observed: "These letters, containing statements admitted by Mr. Hislop to be untrue, or at any rate misleading, can only be explained by a deliberate attempt to discredit Mr. Dickson with a view to Mr. Hislop succeeding to the office of Engineer and Manager."

The Committee unanimously adopted a motion that Mr. Hislop's services be dispensed with, and that he be paid his salary in lieu of the necessary notice.

The Committee also adopted a motion that they advertise for a new Gas Manager, and advise him on his appointment that an endeavour should be made to place Mr. Dickson in a suitable position under him.

Mr. Dickson was formerly Gas Manager at Johnstone.

Asbestos and Insulation Products.

A new catalogue has recently been issued by Messrs. Bell's Asbestos and Engineering Supplies, Ltd., of 157, Queen Victoria Street, E.C. 4, comprising 74 pages with an index and containing a complete description of all the materials marketed by the firm under the above heading.

Experience dating back to 1871, it is stated in the new publication, is constantly utilized in adapting asbestos to the varying needs of engineers. Bell's, apart from being specialists in asbestos, are mechanical engineers controlling a world-wide organization, and the Company claim that they can supply every requirement of the engine room from stocks held in a network of branches and agencies in the chief cities of the United Kingdom and in all principal world markets. This revised catalogue of Bell's Asbestos and Engineering Supplies will be of value to customers and help to familiarize them with the trend of the firm's activities.

The Company also announce that they will shortly be issuing a complete catalogue, which, in addition to embodying the present section, will include in other sections up to 500 or 600 pages detailing their numerous other engineering and workshop supplies now marketed.

Conference to Promote Better Roads.

Three of the most important offices of the newly-formed International Road Tar Conference are to be filled by British delegates.

The Conference, which is attended by representatives from France, Germany, Great Britain, Switzerland, and many other countries, has been called into being by the growing demand for improved road conditions, and the world-wide interest now displayed in road tar. The aim of the Conference, which, it is hoped, will ultmately embrace every tar-using country throughout the world, is to encourage research and experimental road work and to collect information relating to the use of tar in the construction and maintenance of roads, for dissemination among road experts of the member nations.

Sir David Milne-Watson, President of the British Road Tar Association, has been elected President; Dr. Spilker, Germany, and Monsieur Laurain, France, Vice-Presidents; and Mr. Reginald G. Clarry, Chairman of the British Road Tar Association, Chairman of the Executive Committee. Mr. W. E. Cone, Technical Adviser of the Association, is to be Secretary of the Conference.

More tar is used in road work in Great Britain than in any other country in the world, and British methods of road construction are being followed with the closest attention by experts both in Europe and America, as it is generally recognized that in the laying of tar this country leads the world.

The headquarters and secretariat of the International Road Tar Conference are in the offices of the British Road Tar Association in London.

Dundee Gas Department.

£2500 Supplementary Estimate Passed.

The Gas Committee of Dundee Town Council have agreed to a supplementary estimate of £2500 under the heading of mains and services, repairs, and re-servicing of old properties. It was also agreed to transfer as many men as possible from maintenance work to re-servicing of old properties.

A statement prepared by Mr. James Dickson was submitted, referring to the expenditure under the heading of mains and services, repairs, and the re-servicing of old properties for nine months ended Feb. 15 last. Mr. Dickson reported that £10,335, representing 82·68 p.ct. of the estimated amount of £12,500 allocated in the estimates for this work, had been expended. He estimated that a further sum of £2500 would be required over the latter figure to continue the work with the present staff to May 15 next. Mr. Dickson said that he found it impossible to go on re-servicing properties and keep within the estimates.

Mr. A. A. Leslie, Convener, asked if they wished this work to continue. Otherwise, men would have to be suspended.

Bailie Wm. Reid asked what the "flying squad," who went about making gas examinations in the city, did, and whether it was permanent. There was certainly need for such work in the lower class of house, but why should people be employed in examining fitments in houses where people could afford to pay for their own plumber?

Treasurer Frain advocated the transfer of as many as possible of these men so that progress could be made with giving a better supply of gas to people who could not get enough gas sometimes for their gas ring.

The Treasurer thought that a continuance of the work of re-servicing should be carried out by the transfer of men from the maintenance staff, and he moved a motion to that effect.

Mr. S. G. Fraser said that, provided they were agreeable to giving the people in old properties the benefit, he was prepared to second the motion.

Treasurer Frain's motion was agreed to, and, on the motion of the Convener, the supplementary estimate was passed.

forced to the scrubbing plant, which consists of rotary scrubbers in which ammonia and benzole hydrocarbons are successfully abstracted. From the scrubbers the gas passes to the purifiers, in which sulphuretted hydrogen is removed, and thence to a large holder capable of containing 3½ million c.ft. of gas. Compressors are employed for moving the gas to the distributing stations.

In the building in which the gas exhausters are accommodated, all the pumps required for moving the various washing fluids and the recovered products are placed. In the vicinity of this building there are a number of tanks for the storage of washing fluids and crude and pure products which have been recovered.

A special building contains the benzole plant, which consists of recovery, refining, and distilling plants. The benzole is abstracted from the gas in the scrubbers by means of wash oil, and is separated therefrom by direct steam in a column still. Condensed water and benzole are separated in the lower part of the condensers, and the crude benzole so recovered is treated in the usual way for the removal of objectionable constituents. The capacity of the plant is equivalent to 10 tons of benzole products per 24 hours. Ammoniacal liquor is used for the production of nitric acid.

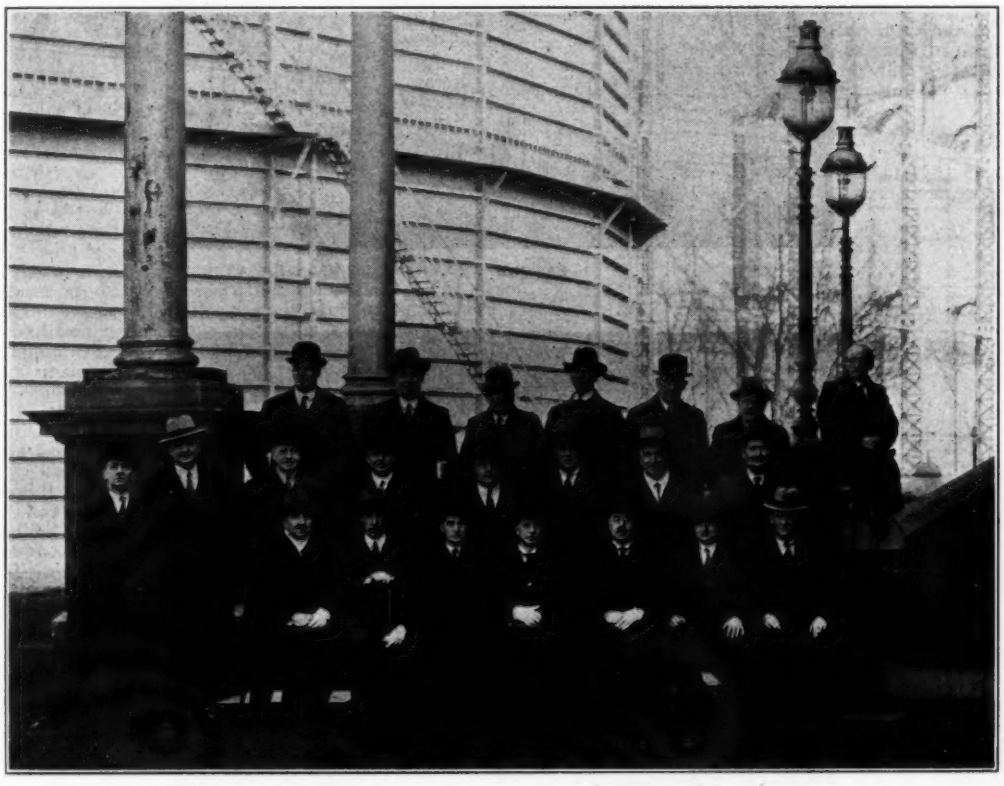
The Magdeburg Electricity Works supplies electric current to the plant at a pressure of 10,000 volts. A transformer station has been provided equipped with three transformers, two equivalent to 1500 K.V.A. and a third 1000 K.V.A.

All the steam required for the installation is provided by a battery of boilers equipped with automatic stokers.

In the design of this installation the economical handling and weighing of wagons and lorries have been arranged for, the works possessing their own shunting locomotive.

A VISIT TO THE GRANTON GAS-WORKS

An account of a visit by the Scottish Regional Gas Industrial Council on Wednesday last



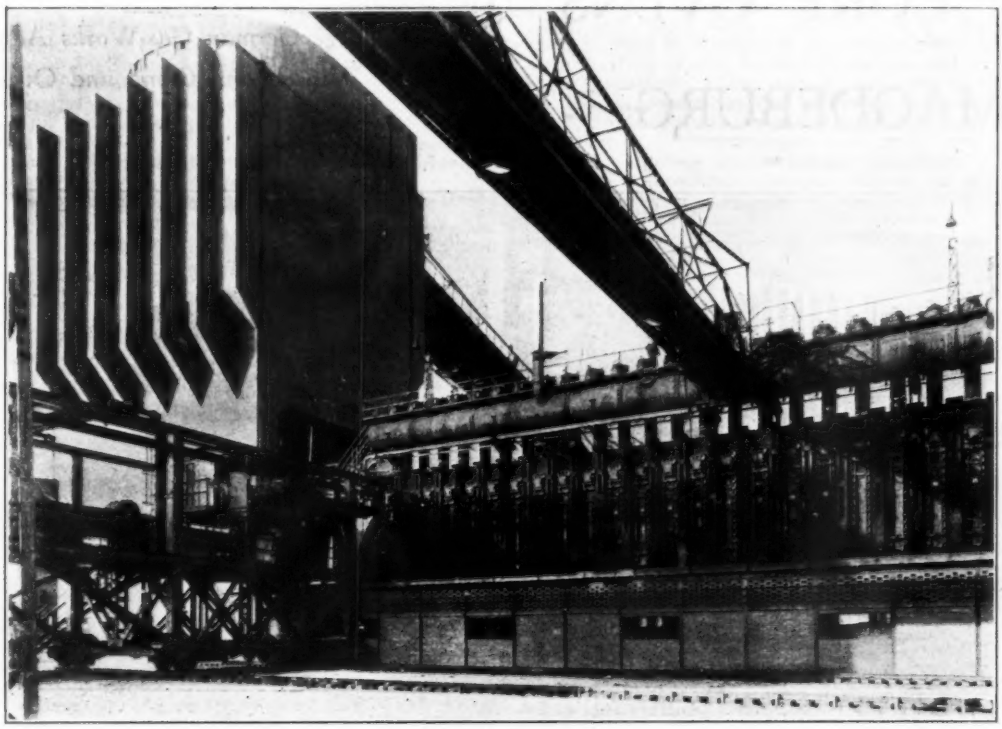
THE PARTY PHOTOGRAPHED AT THE WORKS, WITH THE NEW WATERLESS GASHOLDER IN THE BACKGROUND.

The Council, of which Treasurer Harvey is the Chairman, were received by the Convener of the Gas Committee (Councillor Fergus Harris) and Councillor Aldridge (Chairman of the Public Utilities Committee). They were shown over the Works by the Engineer and Manager, Mr. H. H. Gracie, and his Assistant, Mr. J. Jamieson.

The visit was the outcome of a desire expressed by the workers' representatives to see over a large and modern gas manufacturing station, to assist them to a fuller understanding of the nature of the plant and the operations carried on. Edinburgh was chosen as the venue of this new departure because it was looked upon as one of the most up-to-date undertakings, equipped with all the latest plant and machinery for the production of gas economically. The waterless gasholder—the first of its kind in Scotland—proved an additional lure to Edinburgh.

The satisfaction of the Council with their visit was expressed in a few well-chosen words by the Vice-Chairman, ex-Bailie George Kerr, the Representative of the Transport and General Workers.

Following the visit the members were entertained at lunch in the North British Station Hotel by the Lord Provost and Magistrates of the City of Edinburgh. After a welcome by the Convener of the Gas Committee, Treasurer Harvey proposed a vote of thanks. This was supported by ex-Bailie George Kerr, and by Mr. Ben Smith and Mr. D. C. McKenzie, Scottish Organizers of the National Union of General and Municipal Workers.

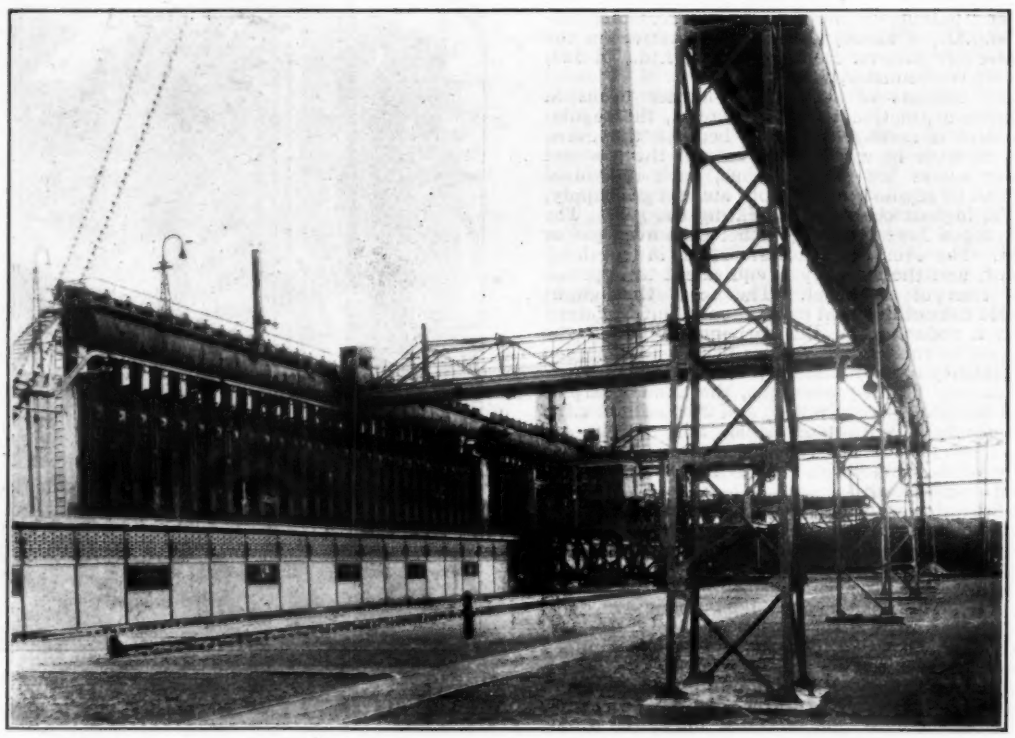


SIXTY REGENERATIVE OVENS—CHARGING SIDE.

to a gib conveyor for loading directly into railway wagons. The whole of the coke can, however, be passed through breakers after passing the grizzly, whence the broken coke is conveyed to a screen, suitable for the various nut sizes, in which separation is effected. Coke nuts can be loaded into either railway wagons or road lorries.

Two turbo gas exhausters are provided for exhausting the gas from the ovens. Each exhauster has a capacity of 28,000 cub.m. of gas per hour at a speed of 3000 r.p.m. One is driven by an electric motor and the other by a steam turbine, so that continuous operation is ensured by alternative sources of energy. Each power unit develops about 300 H.P., the complete equipment being suitably housed in a building of modern design.

The gases are exhausted from the collecting mains, in which some condensation takes place, and pass to the cooling plant, in which ammoniacal liquor and the remainder of the tar are condensed. Two large tanks, each having a capacity of 250 cub.m., are provided for the reception of ammoniacal liquor and tar. The gas is thence



ANOTHER VIEW OF THE OVENS.

electric lamps. The crucial moment arrived for the contest between the old light and the new. The old veteran and the modern champion were to compete in the arena for the "Palm of Victory." The younger competitor was allowed the first test. Suddenly numerous points of light flashed out from the energized metallic wires, and all was ready for the players, who began to send down their bowls to the "Jack" that lay, not too well defined, at the far end of the green. The game progressed for the space of fifteen or twenty minutes, and then a halt was called to switch over to the gas lamps. The electric current was switched off and the gas turned on, and at once the incandescent mantles shed their soft luminous rays over the playing-green, diffusing throughout the lower portion of the building a light of totally different quality. Once again the players sent down their bowls, but how different now was the appearance of "little Jack," standing out boldly and well defined at the far end of the pitch.

And then a strange thing happened: players here and there lifted their hands as though engaged in some mysterious symbolic rite, like the sun worshippers of old. Standing there beneath the little spheres of light, these men with outstretched hands appeared to be invocating the blessing of the rays which streamed from the centres of vitalizing energy. "At last *a little bit of sunshine!*" one was heard to exclaim. "Now I can see the 'Jack' easily," another remarked; and yet a third enthusiast declared that his eyes no longer felt the strain. Such were the actual comments made by those who, for the first time in this covered court, had experienced the benefits of incandescent gas light.

The contest is over now and the victory has been won by gas.

CORROSION IN GASHOLDERS

Mr. Leslie W. Dunn, Gas Engineer to Messrs. Alexander Duckham & Co., Ltd., discusses its prevention by oil filming

The Institution of Gas Engineers, in their first report of the General Research Committee, 1929-30, p. 5, par. 6, advise the necessity for the periodical inspection and maintenance of gasholders. The following matter is relative to this, and should be taken in the light of exchanging views and endeavouring to impart information on a subject which ought to receive every attention, for it concerns both the efficient running of a works, and also life and limb.

Further Government legislation, in the shape of the Board of Trade regularly inspecting gasholders for their safety limit, is not necessary. Enough Government interference already takes place in matters appertaining to our business, and there is no need for Government officials to attempt to direct us on a question which can best be handled by gas engineers. It is imperative that we should solve the subject of corrosion in gasholders ourselves, without outside interference, and this should be the aim of our research work.

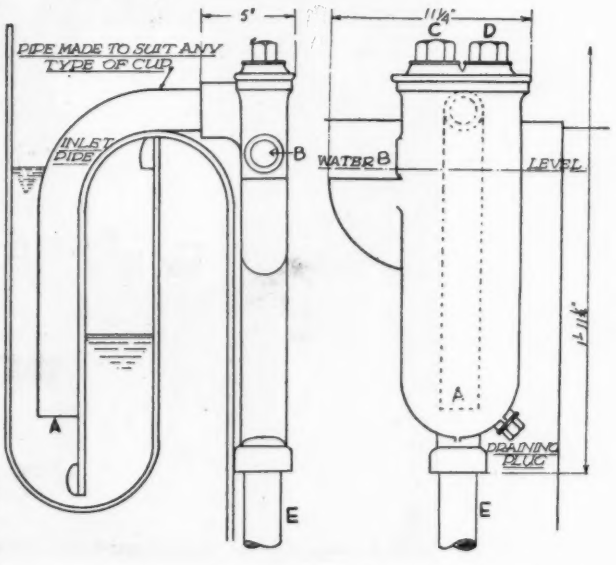
The day of the wrought-iron holder is long past, and steel calls for a closer study of preservation from rust. The three usual methods adopted in the gas industry for keeping a holder in condition are tarring, painting, or oil filming and painting combined.

Tar is most unsightly. Its effect on the metal is definitely not beneficial. Its weight might be a slight advantage, for tar has been seen 3 in. or more thick; but this advantage can be ruled out by the additional strain on the plates. In fact, one can safely say that tar is largely unsatisfactory, except in the case of water gas relief holders, where it reaches the plates unaided. Even in these cases it has been found that a film of red external filming oil applied to the lower lifts has cleaned the tar off, and given them a very much better appearance; and, of course, the oil prevents corrosion.

Complete painting of holders is still the usual practice. If this takes place at correct and regular intervals, and a good paint is used, corrosion is delayed. At the wind and water line of each cup a corrosive action will take place, and plates will be required to be renewed at this point. Also, a very important item to be considered is the fact that painting every two or three years is an expensive proposition.

Filming oil together with paint is the modern and progressive way to treat holders. No corrosion can take place if filming oil is there, and where corrosion has started it will cease, of course, as soon as the oil is applied. Care must be taken in the selection of an oil for this purpose. It is no use applying an oil with an appreciable sulphur content. I would draw attention to the two classes of filming oil: (1) Internal; (2) External. The internal filming of holders is a subject by itself, and, although allied to external filming, has many different aspects, including the quantity of oil required. It is not appreciated generally in the Gas Industry that the quantity of oil required for an external film is comparatively small. If too much is applied, an unsightly appearance will result. The quantity of oil required externally depends largely on the amount the holder is used. It is recommended that the first film should be $\frac{1}{8}$ in. across the cup, and that there should be one pint of oil for every square yard of plate area to be covered. On a three-lift holder of 150 ft. diameter, approximately two barrels would be sufficient for the first film. After first application the speed at which it is used will be noted, and, in general practice, one can say that approximately one barrel only will be required annually, provided syphons are fitted for conserving the oil.

It must be appreciated here that, having filmed, it is still necessary to paint the crown and top few sheets of each lift, or arrange regularly to lower the holder completely. This latter practice is difficult where the holder capacity is limited. Experiments are now in progress with a view to providing a special oil for the protection of the crown, thus obviating frequent repainting.



The Matthews syphon for dealing with overflow water (as illustrated) is most necessary, not only to conserve the oil in the cups, but to obviate the corrosion set up by rain water overflowing haphazard down the side plates. Even where oil has not been applied it prevents that unsightly and corrosive overflow. This appliance is a neat aluminium casting with the dip pipe to the cup supplied to suit any grip, to the top of which it is attached by a clip, without the necessity of drilling the holder sheets. It is designed to give the sufficient clearance when the lifts are lowered, and will take off all rain water if the requisite number is fitted, as indicated in the following table, which is based on the maximum rainfall in the British Isles.

100 ft. diameter	1 syphon
140 ,, ,, ...	2 syphons
170 ,, ,, ...	3 ,,
200 ,, ,, ...	4 ,,

An oil-filmed holder is not so attractive as one which has been newly painted, but a holder correctly filmed with either red or colourless specially-prepared filming oil, fitted with syphons and then painted on the crown, is far from being unsightly. It is a much cheaper method than painting and will solve the problem of corrosion.

BRIGHTER BOWLS - - AT NIGHT - -

A Triumph for Gas over Electricity

[From the current issue of the Co-Partnership Journal of the South Metropolitan Gas Company]

In a corner of South-East London a notable victory has been won for gas lighting. The arena in which this battle was fought is a covered and enclosed area devoted to the historic and ancient game with which is associated the name of Sir Francis Drake. Here, during the winter months, exponents of the time-honoured game of bowls gather to test their skill, as did Sir Francis on the Hoe of Plymouth in the days of "Good Queen Bess."

While this covered sports ground was in course of preparation the question of gas lighting was discussed with one of the South Metropolitan Gas Company's representatives, who explained the advantages of the gas lamp for this particular purpose; but the architect responsible for the building stated that he was satisfied that the only practical method of illuminating the green was by electric light, and no reasonable argument could dissuade him from that opinion.

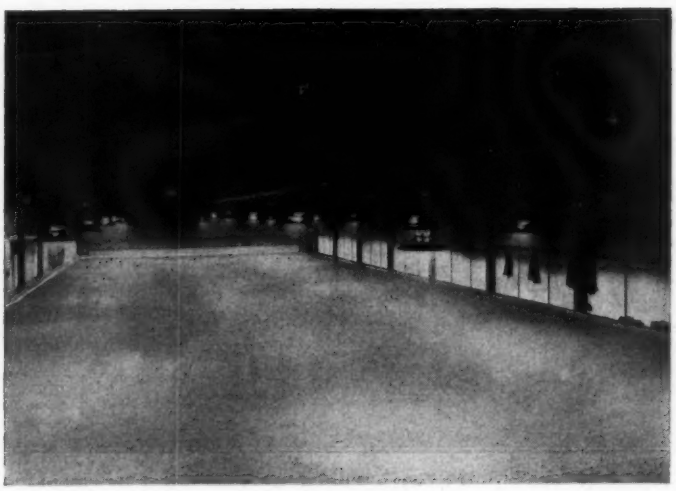
For twelve months the electric lamps were on trial, and during that period many experiments were made with various arrangements of lamps in order to obtain a combination of lighting units which would satisfy the requirements of the players. At length the problem was believed to have been solved, and the electric undertaking handed over the installation as being the best that could be made.

It is interesting to note that a "Metro" heating plant had been installed for providing warm air currents in the building, resembling as far as possible the warmth of a mild summer day with a soft and gentle breeze.

At the beginning of the winter season, when the heating plant and lighting installation were brought into use, it was discovered that something was amiss. The soft glow was conspicuous by its absence. Could this possibly be due to the lighting medium employed? It is common knowledge that the light from an electric lamp is not soft, and is decidedly cold. Here, perhaps, was the secret of the discomforts experienced by the players.

It was then explained that the energy that streams from the incandescent gas mantle is essentially different in its quality and effect from the energy that comes from the electric light. The case for gas was again considered, and it was arranged that its claims should be allowed to be put to the test. A free hand and no favour was all that was asked. The proposal being approved, it was agreed that the players themselves should decide the respective merits of the two illuminants. The running costs of the two installations were to be the same. It did not take long to install the gas lighting equipment, and within a short space of time gas lamps were to be seen side by side with the

BEFORE . . .



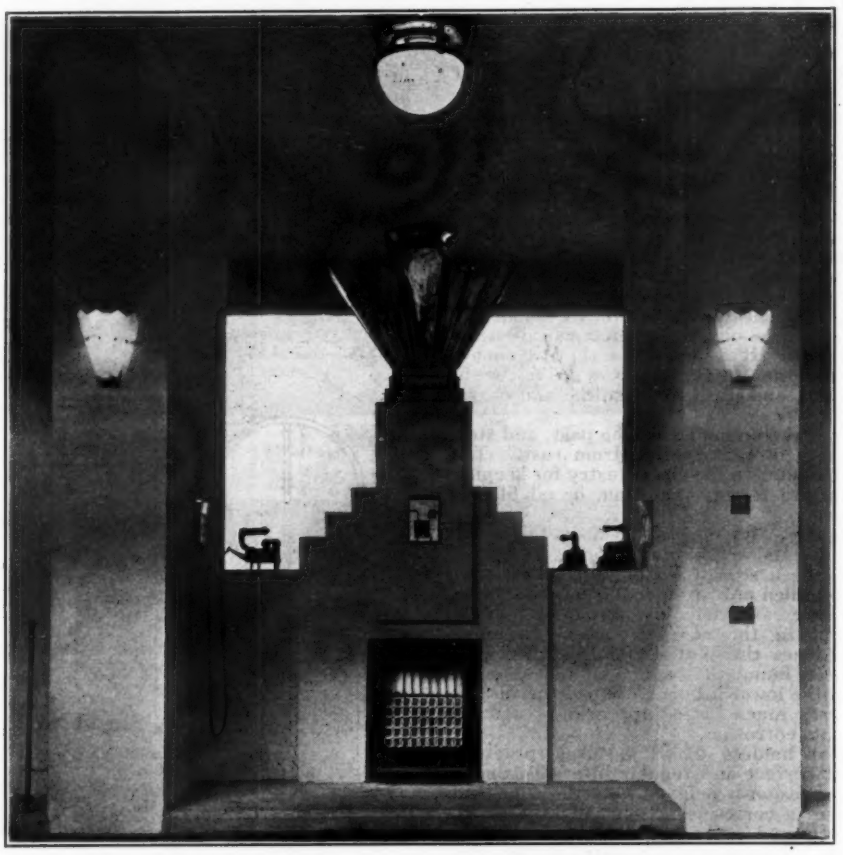
. . . AND AFTER.

GAS AT THE SOUTH LONDON EXHIBITION

The South Metropolitan and the South Suburban Gas Companies in co-operation at the Crystal Palace

The first of a series of annual South London Exhibitions was opened by Viscount Burnham on March 11 at the Crystal Palace, and gas was brought well to the fore by the South Metropolitan and the South Suburban Gas Companies co-operating in a strikingly attractive stand occupying a central position in the exhibition.

As the accompanying photographs testify, the stand demonstrated the many domestic uses of gas in an excellent manner, and the co-operating Companies are to be congratulated on their enterprise. The Exhibition reminds one very much of the North London Exhibition, which is held annually at the Alexandra Palace, Wood Green, and already described in the "JOURNAL," and in each case the gas exhibits constitute the most attractive stand. All the latest "Metro" appliances were in evidence, among which the following are worthy of mention.



STRIKING DISPLAY IN THE SOUTH LONDON GAS EXHIBIT.

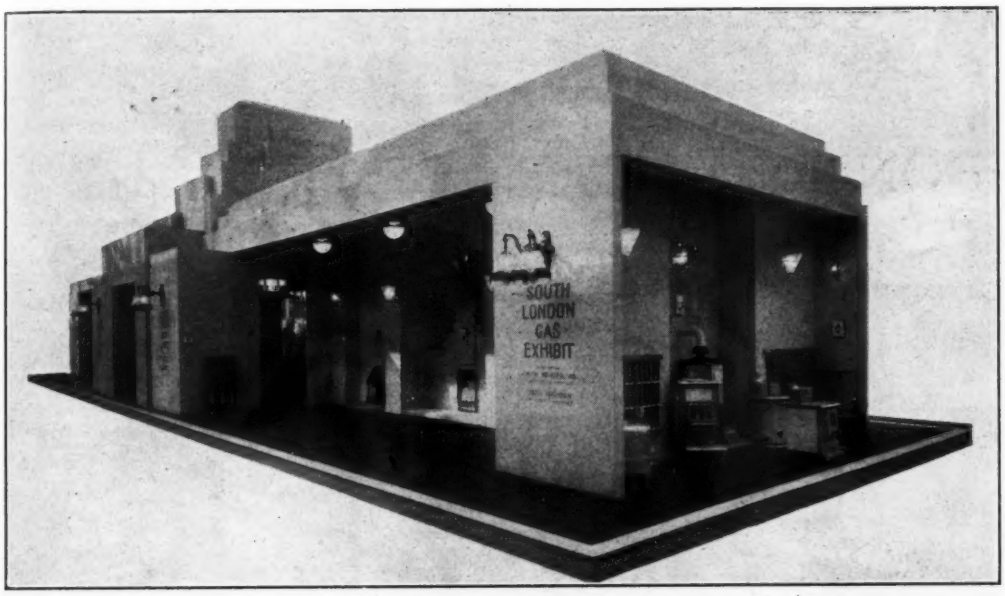
"METRO" APPLIANCES.

The "Metro" range of gas storage water heaters were particularly attractive with their chromium and enamelled finishes and automatic temperature control. The type for basin or sink use works without any attention. When hot water is drawn off the gas flame is raised to heat a fresh supply. When the water is heated the flame is reduced to a small jet, just sufficient to keep the water hot. The thermostat is set to about 150° Fahr., and as soon as the water reaches this temperature the gas jets are lowered automatically. Hot water tapped from the heater is replaced by cold water which causes the flame to go up again. By setting the mixing valve between "hot" and "cold" water at any temperature from about 50° to 150° can be obtained. The "Metro" multi-point geyser is also a particularly attractive and useful appliance, an abundant and immediate supply of hot water being available day and night anywhere throughout the house simply by turning the tap. This apparatus is finished in white porcelain enamel, and is the result of many years of manufacturing experience. Any part of the appliance can be removed independently without dismantling the geyser and baffle or detaching either from the wall. The pilot flame automatically lights the burners whenever a hot water tap is turned on.

FURTHER HOT WATER APPARATUS.

"Sunhot," "Ruud," "Ascot," "White Chief," and "Newlyn" completed the comprehensive range of hot water appliances, together with an "Ideal" gas boiler, by the National Radiator Company. The latter appliance has an insulated jacket enamelled light grey, and is complete with gas control valve and thermostat with copper tube connections, and can be used for central heating through a number of radiators according to the size of the boiler.

The "Newlyn" gas boiler is an interesting appliance.



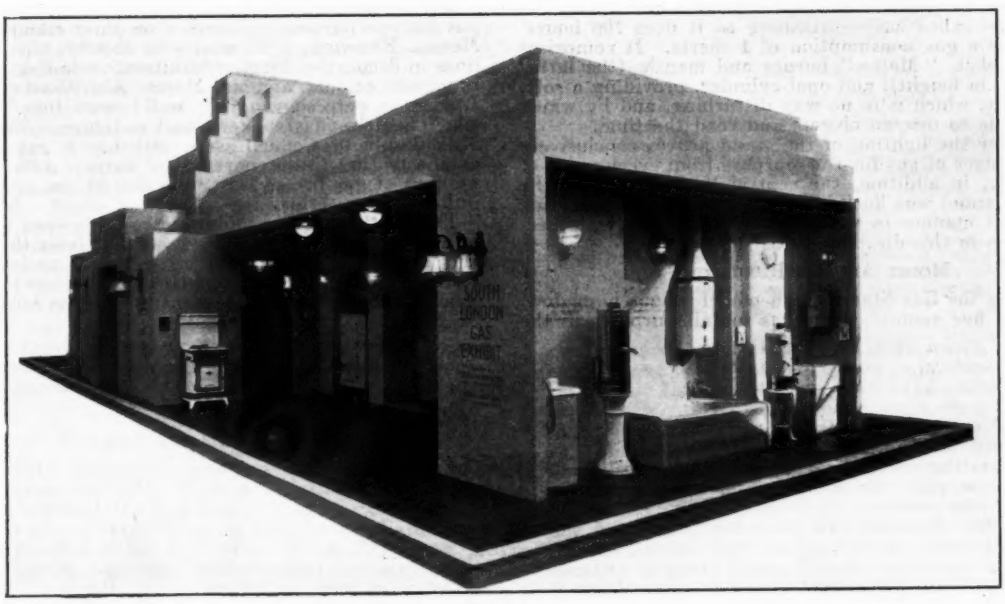
This is a new design of boiler, and provides an ever-ready and plentiful supply of hot water for the personal needs of the family—shaving, shampooing, washing (but not for the bath or clothes washing), &c., and also for the hundred-and-one domestic uses—washing up the plates and dishes, house cleaning, &c.—for which hot water is a constant necessity. It is also useful in doctors' and dentists' surgeries. We were informed that this appliance is entirely automatic in action, a patent thermostat reducing the gas to a tiny flame when the water is hot and raising it again when the water is drawn off. As a further aid to economy, the boiler is thoroughly insulated to prevent the escape of heat. The cold water supply is also automatic in action; the boiler is always full of water, and it cannot become damaged through inattention. It is finished on the outside in cream cellulose enamel, with fittings chromium plated.

Heating and Cooking.

A wide "Metro" range of gas fires was on view, controlled by recessed wall taps, which are calibrated to enable the amount of gas most suitable for warming any particular room to be obtained. In this connection the "pillar cocks" are interesting, enabling the fire to be regulated without the trouble of bending down to do so. Smokers' companions beside the fires completed an attractive setting. "Metro" coke fires were exhibited in suitable surrounds, together with the "Metro-Log" gas fire, which, with its luminous, lambent flame, produces all the effect of a real log fire without any of its disadvantages. These fires have a consumption of ¼ therm per hour, and are made in various designs.

For heating also was exhibited the "Romain" panel heater, which gives a steady warmth, burning as little as 1 therm of gas in 52 hours. It is, of course, eminently suitable for offices, halls, and even large private rooms, while it can also be used for heating garages without danger. It is finished in an attractive manner in old gold, and is intended to be fitted, by the lugs provided, against a wall—an advantage wherever floor-space is a consideration. The "Unimain" gas-heated radiator was exhibited, also finished in old gold, one of the main features being the ease with which it can be cleaned or overhauled, in however inaccessible a position, this being possible without disconnecting the supply.

On the cooking side there were a number of the latest lines in cookers, including the "Mainamel De-Luxe," with its oven heat control dial facing forwards to facilitate set-



INTERIOR VIEW OF THE SOUTH LONDON GAS EXHIBIT.

ting. The taps are hot brass stampings in stainless finish. Other high-grade cookers, including the high-level type, were to be seen, some being fitted with a lighter similar to that used on the smokers' companion. Other kitchen appliances included the "Electrolux" refrigerator in two standard types, the "Wonder" washer, and the Dean gas-heated washing machine, and gas irons, &c., ironing demonstrations being continuous on two separate parts of the stand.

Lighting.

The lighting of the stand deserves special praise, the most attractive fittings being utilized in every case. Suggs ventilating lights were in evidence, together with some very fine examples of decorative panel lights, all, of course, distance controlled. Reading and standard lights showed what could be achieved in this direction, particularly with the help of the upright burner, while a fascinating little incandescent night-light was suggestive of a new "load"—if it can be called such—providing as it does 700 hours' lighting for a gas consumption of 1 therm. It comprises a wall bracket, "Metro" burner and mantle (the latter about ¼ in. in height), and opal cylinder, providing a soft, steady light, which is in no way disturbing, and by which it is possible to discern objects and read the time.

Altogether the lighting of the stand proves conclusively the advantages of gas for this purpose from every point of view, while, in addition, the central "pinnacle" on the top of the stand was flood-lighted at night, demonstrating the efficient manner in which gas can compete with electricity even in this direction also.

Model All-Gas Bungalow.

Adjoining the Gas Stand was a model all-gas bungalow, comprising five rooms. Here gas for all purposes in the home was demonstrated, even to a baby "Electrolux" refrigerator in the kitchen.

The Gas Stand, which was designed by the South Metropolitan Company and executed by the South Suburban Company, was finished in an attractive colour scheme of blue, biscuit, and bronze, and was efficiently staffed by eleven attendants. A very large number of inquiries were dealt with, and very considerable interest was stated to have been displayed by the public in this exhibit, as an instance of which it may be mentioned that at the commencement of the exhibition 4000 leaflets describing each of the various appliances were printed. By the third day there were none left, and during the course of the exhibition the holders above each piece of apparatus, containing 150 leaflets each, had to be re-filled three or four times a day.

Other Exhibitors.

A large number of other exhibitors at the Palace utilized gas for one purpose or another on their stands, including Messrs. Easiwork, Ltd., who were showing their attractive lines in decorative kitchen furniture, including gas cookers in various colours, and also Messrs. Anti-Waste Appliances, Ltd., who were showing the well-known Lambert "white tile" heaters, gas cookers, and radiators. The National Milk Publicity Council were utilizing a gas cooker for demonstrating the preparation of various milk dishes. A number of gas fire pylons were also in use in the mannequin parade section.

The South London Exhibition was only open for ten days on this first occasion, but so great has been the success of this essay that it will run for a longer period in future years, and the South London Gas Exhibit has already been assured of a prominent and central position for next year's exhibition.

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations ———

Southern Association of Gas Engineers & Managers

Presidential Address of Mr. Harold C. Smith, M.Inst.C.E., of Tottenham

The Annual General Meeting of the Association was held on Thursday last at the Hotel Metropole, Northumberland Avenue, W.C., under the Presidency of Mr. HAROLD C. SMITH, M.Inst.C.E., of Tottenham. At the luncheon which preceded the meeting, the President was supported by his Chairman (Mr. Henry Woodall, M.Inst.C.E.), and the following Directors of the Tottenham and District Gas Company: Mr. Henry Bailey (Deputy-Chairman), Mr. Thomas Goulden, M.Inst.C.E., and Mr. Edward Woodall.

The PRESIDENT said he had received an apology for absence from Sir David Milne-Watson, who would have liked to be present, but had been unavoidably detained elsewhere. Mr. R. W. Foot and Mr. Thomas Hardie were also unable to be with them at luncheon, but they hoped to see them during the afternoon meeting. The President of the Institution of Gas Engineers (Mr. Harold E. Copp) was unable to join them, owing to ill-health; and he was sorry to say that two of his Directors also were absent from the same cause. Mr. W. A. Surridge was not very ill, but Mr. A. E. Broadberry, as most of them knew, had been seriously ill, though he was glad to say he now seemed to be on the high road to recovery.

SPEECHES AT THE LUNCHEON.

Mr. R. H. RUTHVEN (Ramsgate), Vice-President of the Association, proposed the toast of "The Visitors," mentioning some of the distinguished gentlemen who were among them, including Dr. C. H. Lander, Director of Fuel Research. He said that the reports issued by the Fuel Research Department impressed everyone by their accuracy. They were drawn up by experts who appreciated that this was essential. Along with him there was Mr. Henry Woodall, Chairman and Managing-Director of the President's undertaking, and the holder of many other important positions in the Gas Industry. With the toast, it was his privilege to couple the name of Mr. Woodall. [Applause.]

COURAGE, ABILITY, AND ENTERPRISE.

Mr. HENRY WOODALL thanked the members, on behalf of himself and the other guests, for the very kind way in which the toast had been proposed and received. He said he had greatly enjoyed being present, and was only sorry he would not be able to remain to hear the President deliver his address. He could not help thinking that perhaps he had deserved a little hospitality from the Association, because about eleven years ago he took rather an important part in securing Mr. Smith from the Midlands and bringing him South. He had never had any cause to regret his action in this matter. In fact, it seemed to him that it was an action which shone like a good deed in a naughty world. Mr. Smith had done yeoman service for the Association, and now members had shown their appreciation of this by making him President. He (Mr. Woodall) understood the Association wished to visit Tottenham on May 15 next. On behalf of himself and his colleagues on the Board, he extended to them a very hearty invitation. They would, he was sure, find much there to interest them, because the President was a man who was not easy to satisfy. The works would be found to provide much evidence of being managed by a man of courage, ability, and enterprise.

RESEARCH AND MORE RESEARCH.

Sir ARTHUR DUCKHAM next submitted the toast "The Southern Association." In an Association of this sort, he said, one felt that the Gas Industry came closer together. There was closer co-operation in District Associations than could be possible in the Institution of Gas Engineers. All those who were connected with the Gas Industry realized the great necessity for co-operation, not only in their technical work, but in the commercial and other branches. Not long ago, he was discussing in the Midlands, with some good friends of his, the right way to build vertical retorts. They had a two-hour discussion, and then concluded that the four of them, who had had more than 110 years' experience of carbonizing between them, knew very little about the matter. In an Association of this kind they could get down to closer consideration of the subject of gas-works practice. In gas-works they had very much more to find out than was the case in other directions. They had not by any means approached the utmost efficiency in gas-works practice. Coal, for instance, was a very difficult subject, and there was much more to be done in the way of research. The gas engineer had before him a wonderful field of adventure and improvement in working on his raw material, coal. They could also get down to closer consideration of the best way in which to treat their bye-products; and he could mention other matters to the end of which they had to get, while now they were only at the beginning. Theirs was an old industry, and splendid work had been done, but there still remained very much indeed for the Gas Industry to do, and an Association like theirs could be of great help. The old reticence, when men shut themselves up in their own works, and kept others out, had passed away entirely. ["Hear, hear."] This was exemplified very much in their Association. It was a

THE PRESIDENT,

H. C. SMITH, of Tottenham.

Mr. Smith received his training in gas engineering with the City of Birmingham Gas Department. He was appointed Works Superintendent at the Swan Village Works in 1912, and, with the exception of the war period (during which he served in the Royal Field Artillery), occupied this position until 1920, when he was appointed Works Superintendent at the Tottenham Works. He became Chief Engineer at Tottenham in 1922. He was elected an Associate Member of the Institution of Civil Engineers in 1925, and a full Member in 1928. Mr. Smith is an Examiner in Gas Engineering to the Institution of Gas Engineers.

pleasure to couple with the toast the name of their President, Mr. Smith. They all knew him, and the work he had done for the Association and elsewhere had been extraordinarily valuable. They appreciated his organizing ability. It had been demonstrated in various directions, such as in connection with the British Industries Fair at Birmingham. The Gas Industry in the past had been led by men of great technical ability and great administrative ability. For example, there were Sir Corbet Woodall and Mr. Harry Jones, who were represented on that occasion by their sons Mr. Henry Woodall and Mr. Frank Jones.

The "Man who Knows" on the Board.

He would like all those in technical command of works to feel that the highest positions in the Gas Industry were open to them. He believed a technical administrator was desirable, and looked forward to the technicians getting gradually into administrative positions. He liked to see the "man who knew" come on to the Board of Directors, whether from the engineering, chemical, accountancy, or commercial point of view. He did think that the time had come when Directorships of undertakings should be in the hands of people who had vital knowledge of the Gas Industry. There was no better way to get good work out of people than to give those people responsibility. Without responsibility it was difficult for anyone to perform useful work; thus responsibility was for the good of all.

Readiness of the Tottenham Company to Further the Interests of the Gas Industry.

The President said that, before replying to the toast, he would like to thank his Chairman for the very kind invitation he had given to the Association to visit Tottenham on May 15, and to say at once that they accepted with the greatest possible pleasure. He would also like to thank Mr. Woodall sincerely for his very kind personal references. He (Mr. Smith) was just as pleased that he left Birmingham eleven years ago as Mr. Woodall had been good enough to say that he (his Chairman) was. This would not be the first occasion on which this Association would have visited Tottenham. The Tottenham Directors had always been well known for their hospitality, and for the help which they gave so readily on all occasions to further the interests of the Gas Industry. As an instance of this, he believed he was right in saying that the Tottenham Company, under the Chairmanship of Sir Corbet Woodall, was one of the first—if not the first—to become a member of the British Commercial Gas Association on the full subscription basis. He believed that he was in a unique position as their President, in having two of his Directors as members of the Association. Mr. Henry Woodall had been a member for 30 years, and Mr. Broadberry for 46 years. He did not think that anything more was needed to show the interest which he knew was taken by his Company in the Association.

He felt that it was a great honour to be in the position that day of replying to the toast of the Association proposed by Sir Arthur Duckham. Sir Arthur was one of their own members, and one of whom both they and the whole Gas Industry had every reason to be proud. His reputation as an engineer, as an inventor, and as an administrator was not by any means confined to the comparatively narrow limits of the Gas Industry, and they were grateful to him for his readiness to help the Association and the Industry in every way and on every occasion that he possibly could. Their Association had behind it over 50 years of good, useful work, and dated from the time when the District Associations provided the only means whereby gas engineers and managers could readily meet together and discuss the difficult problems which they had to solve. The Southern Association had always taken its part, in conjunction with other District Associations, in the formation of new organizations which it had been found advisable to set up from time to time to deal with the many ramifications of their industry. Despite the formation of these new bodies, the Association continued to grow in strength, both numerically and in the importance of the work it carried out.

The Millennium?

The meetings of the Southern Association, in common with most gas meetings which he was privileged to attend, were characterized by a spirit of cheerfulness which would possibly surprise those members of a competitive industry and the public who had been led to believe by Cabinet Ministers—backed up by the Press—that the millennium arrived with the passing of the 1926 Electricity Supply Act, and that such a cheap and abundant supply of electricity for any and every industrial and domestic purpose would be provided that gas would rapidly become a back-number. The publicity which the electrical industry received free of charge during the passing of the Electricity Act and afterwards had undoubtedly had an effect on the gas business. Local authorities had in some instances been deluded into thinking that there was something miraculous about electricity, and that they would be considered out of date and old-fashioned if they allowed gas to be used on their housing estates and for lighting the streets over which they had control. Consequently, a large number of people in this country were saddled with a system of lighting—and in some cases cooking—for which they could not afford to pay, and which they did not want. He had heard only during the last few days of an electricity undertaking owned by a local authority not many miles from where they were now sitting which had found it necessary to provide its consumers with electric lamps free of charge, in order to enable them to use current.

The unfair boosting which the electrical industry had received reached its climax in the recent undignified efforts of the Minister of Transport—a Minister who had charge of the Department which they had been led to understand a few years ago was to be dispensed with as a luxury the country could not afford, but which ever since had been trying to justify its existence by introducing legislation and making orders calculated to hamper the natural business-like development of industry, and to replace this by bureaucratic control and all this implied. He thought there was every reason to believe—from the attitude both of the Press and of the public—that this time the Minister of Transport had gone too far, and had not only alienated the sympathy of every fair-minded person, but had also aroused their suspicions.

The Great Doubt.

Why should it be necessary for meetings to be called all over the country by a Cabinet Minister who attended in person and exhorted the representatives of electrical undertakings present to lay their cables in every road in their areas of supply, whether those cables were likely to prove remunerative or not? Why should it be necessary for him to urge them to sell as much electricity as they humanly could for every domestic purpose by insisting on assisted wiring schemes and special tariffs? Surely, electricity supply undertakings were anxious to sell as much electricity as they could, provided they did so at a profit. Was the reason for all this activity on the part of the Minister due to a growing anxiety lest the consumption of electricity be not sufficient to warrant the expenditure on the much advertised electricity grid? Only the Minister or those in his confidence can answer the question, but the effect on thinking men and women was becoming apparent.

Protest by the Gas Industry.

He had been very interested—as no doubt they all had been—to read the letter of protest in the newspapers on the previous day, signed by the Chairman, Vice-Chairman, and Joint Secretaries of the National Joint Industrial Council for the Gas Industry—a protest, as the letter stated, not only on behalf of the employers, but also on behalf of the 113,000 workers engaged in the production and supply of gas to nearly 10 million consumers. It is up to the members as individuals, and as an Association, to see that their proportion of these 10 million consumers were given the best gas service that it was possible to give. They would not then need any Minister of the Crown to act as a gas salesman and tell them to sell more gas.

Sir Arthur Duckham had very kindly made reference to his (Mr. Smith's) work in connection with the British Industries Fair. The main portion of that work, of course, had been done by their good friend Mr. R. J. Rogers. All he (the President) did was in regard to organizing the Joint Gas Conference.

THE BUSINESS MEETING.

The proceedings at the subsequent meeting were opened by the confirmation of the minutes of the previous meeting as published in the "Journal."

The President then referred to the loss the Association had sustained by the death of one of their old members, Mr. E. W. Smith, who was formerly Engineer at Chelmsford; and, as a mark of respect, the members stood silently in their places.

New Members.

The following new members were elected, on the proposition of the President, seconded by Mr. R. H. Ruthven (Ramsgate):

Mr. W. M. Paterson, Bath.
Mr. A. S. Lee, Commercial Gas Company.
Mr. L. L. Miell, Commercial Gas Company.
Mr. A. H. Dunn, Launceston.

Representative on the Institution Council.

Mr. W. E. Dean (Exmouth) said it was both a pleasure and a privilege to propose that their President be appointed the representative of the Association on the Council of the Institution of Gas Engineers. He had had ample oppor-

tunity of seeing the work done by Mr. Smith on that Council, and knew that the affairs of the Southern Association would be well looked after by him.

Mr. C. VALON BENNETT (Rochester), seconding, said Mr. Smith had been on the Council for six or seven years or more, and they hoped he would remain there for some years to come.

PRESENTATION TO THE RETIRING PRESIDENT.

The PRESIDENT said it was now his very pleasant duty to present to the retiring President, on behalf of the members, a small memento of his year of office. They were very proud to have had associated with them for the last year as their President a man of such eminence in the Gas Industry, and one who bore such an honoured name, as Mr. Frank Jones. The Association was honoured when he agreed to accept the office, and it had been strengthened by the admirable manner in which he had carried out his duties. It was his (Mr. Smith's) pleasure during his period of office as Hon. Secretary to approach Mr. Frank Jones and ask him to allow his name to be put before the members, with a view to his election as Vice-President, and subsequently as President. Though a very busy man, Mr. Jones said at once that if they thought it would be for the good of the industry, he would accept the office with pleasure. As Vice-President and as President he had given the affairs of the Association his time and keenest interest, even at serious inconvenience to himself. He asked him to accept this small memento of what had been a very memorable year to them, and of what they hoped had been to Mr. Jones a very happy one.

Mr. FRANK JONES said he was very pleased that he had agreed to come and do what he could for the Association. He had known of the work of the Association for some time, but had never taken much part in it. During the past year, however, he had learned a great deal more. He had come to know many people, and his opinion of the Gas Industry had gone up a good deal. The Association was one of the most live among Institutions connected with the Gas Industry. Why, he did not know, except that there were always many people present at the meetings, obviously at inconvenience to themselves, who were interested in coming to do something for the Gas Industry, and not solely for their own particular undertakings. He would like to say how pleased he had been to hear the remarks of Sir Arthur Duckham at lunch about the necessity of people who had control of gas undertakings encouraging persons to come into the service of the Industry. These were words which he thought people in charge of undertakings should study with great care, and try to put into practice. He thanked the members for their gift, and the Committee and Mr. Donaldson for their help during the past year. Mr. Donaldson was a tower of strength to the Association, and had made his own duties very light.

PRESIDENTIAL ADDRESS

of Mr. HAROLD C. SMITH, M.Inst.C.E., Chief Engineer to the Tottenham and District Gas Company.

In rising to address you on the first occasion as your President I do so with great pleasure and with keen appreciation of your kindness in honouring me as you have. Believe me this is not an empty form of words. I fully appreciate the importance of the office to which you have elected me and the duties and responsibilities attaching to it. You have had as your Presidents in the past many men of eminence and distinction in their profession, and it is with some trepidation that I follow them. I can only promise to do my utmost to maintain the traditions which they have set up and to endeavour to leave the Association at the end of my year in the flourishing and healthy condition in which I find it.

I believe that, of the many bodies we have to-day dealing with the various phases of our industry, the work of the Associations of Gas Engineers and Managers ranks high in order of usefulness and importance; and I would urge the members of this Association to increase its usefulness both to themselves and their fellow members by more regular attendance at its meetings, particularly the monthly meetings of the District Sections.

One of the first regulations made by our predecessors when founding this Association in September, 1875, was to the effect that

> The Association shall be for the purpose of more frequent intercourse among gas engineers and managers connected with the Southern Counties on all matters of gas engineering and manufacture than is at present available.

I think it will be agreed that, while the founders of this Association may have appeared to limit somewhat its scope by the words "on all matters of gas engineering and manufacture," it was not their intention to do so; and from the development of the Association they might have substituted the words "on all matters connected with the Gas Industry." There is no problem connected with the Industry which any member has to face, whether it be technical, commercial, or administrative, which does not receive the sympathetic and helpful consideration of his fellow members, especially if it is raised at a District meeting. The problems of the smaller undertakings are considered of equal importance to those of the large, and are given just as much attention.

DISTRICT SECTIONS OF THE INSTITUTION?

I have read recently of suggestions that the Associations of Gas Engineers and Managers should sink their identities and become District Sections of the Institution of Gas Engineers. This to my mind would curtail much of the usefulness of this Association as it is constituted, and of any other Association similarly constituted. While we look on the Institution of Gas Engineers with pride as our parent body, and now that it has been honoured by the granting of a Royal Charter look forward to its status being raised and its usefulness increased, at the same time our activities cover a much wider field than do those of the Institution, and I cannot see that any useful purpose would be served by converting the Senior Associations into District Sections of the Institution.

Possibly the same objections would not apply in the case of the Junior Associations. Some of these Associations have now imposed an examination obligation on new members, and no doubt those new members will wish to qualify for membership of the Institution of Gas Engineers by passing the appropriate examination at a later date. If the Junior Associations were reconstituted as District Sections of the Institution of Gas Engineers, it is conceivable that both the Institution and the Associations might be strengthened. But this is a matter rather outside our province; and I only make the suggestion for the consideration of those who think that the work of the Institution would be furthered if it were in a position to organize or co-operate more closely with District activities.

INDIVIDUAL EFFORT.

The more co-operation we have in our industry, the better, so long as we as individuals are not content to rest on our oars, hoping that the National Bodies are doing for us the work which we should be doing ourselves. The competition we have to meet is growing in intensity, and this is no time for any slackening of individual effort. While making the fullest possible use of the advice and assistance afforded by the Institution of Gas Engineers, the British Commercial Gas Association, the National Gas Council, and the other co-operative organizations in our Industry, it is at the same time the duty of those connected with the several undertakings

(*a*) to do all in their power to improve their methods of manufacture and distribution, with the object of supplying to consumers a standard gas at a standard pressure at the lowest possible price;

(*b*) by local advertising to supplement the work of the British Commercial Gas Association and to keep before the public the many purposes for which gas may be used and its outstanding advantages; and

(*c*) to combat as strongly as they are able all actions taken by other bodies in their districts which may be inimical to the Industry.

An Association such as this provides a valuable vehicle by means of which any information obtained or experiences undergone—whether good or bad—in any of the directions indicated may be pooled for the benefit of all members. The interchange of views which occurs at our meetings is most helpful, and I would strongly urge once more those members who have not in the past taken advantage of the facilities offered them by the Association to do so as often as they are able in the future. I do not think they will be disappointed.

LONDON AND COUNTIES COKE ASSOCIATION.

The report of the Eastern District for last year calls attention to the suggested formation of the London and Counties Coke Association, an Association which owes its initiation to the members of that District and its consummation to the generous way in which their suggestions were received by the London Coke Committee, with the result that an Association has now been formed which we have every reason to believe will do much towards improving the grading and quality of coke and the development of coke sales.

Many of our past-Presidents have been in the happy position, when delivering their Presidential Addresses, of having recently been concerned with the building of new

works or the carrying-out of considerable schemes of reconstruction. Unfortunately I am not in that position today. Most of the work of this nature with which I have been connected in recent years, and which might be worthy of mention in this Address, has already been described. I will therefore ask your indulgence for a short time while I mention a few matters connected with our Industry which I hope will be of sufficient interest to justify their inclusion in this Address.

The carbonization of coal on well-managed gas-works has now reached a high standard, and, while I would not suggest that it has by any means reached finality, at the same time the improvements which have been made in the design and construction of plants and of labour-saving machinery, and in the skill with which the plants are operated, are such that it is in other directions that we must turn in order to give to our consumers the ideal service which is our ambition.

We are suppliers of smokeless fuel in gaseous and solid form; and while the quality and composition of gas is more carefully controlled than it ever has been, the quality of our solid fuel—coke—although improving leaves much to be desired. There is plenty of room for development in the design of coke-grading and coke-handling plants.

What is perhaps of more importance is the need of greater attention in the preparation of the raw material from which the coke is made. If we are to supply coke of a standard quality, it is essential that we should either be able to depend on the composition of the coal we purchase, particularly so far as the ash content is concerned, or else we should be in a position to control that quality by treatment at the gas-works.

In coke we have a remarkable domestic fuel, the sales of which are developing rapidly—at any rate in the South of England. The more the sales of coke to the domestic user increase, the greater is the need for improving and maintaining the quality. A variation in the percentage of ash in the case of a large tonnage supplied for use in an industrial boiler may not be noticed by the stoker who has to operate the plant, but any increase is quickly noticed by the domestic consumer (who very often has to be his own stoker), especially if the increase means that the bath water is only lukewarm or the sitting-room fire has gone out. One hundred tons is not a large quantity to supply in one consignment to one industrial buyer, but a similar quantity may be distributed among two thousand domestic users, many of whom have not storage accommodation for more than 1 cwt., any or all of whom may express in forcible language to their friends as they travel by train to business their opinion of coke as a domestic fuel.

Coal Cleaning.

Some collieries are now making attempts to clean their coal; and while such attempts should be encouraged, it is a pity that so often the quantity of ash removed is replaced by an equivalent weight of water which, while not so harmful as the ash, is at the same time expensive when paid for at the price of first-quality gas coal.

There is a very marked difference between the coke produced from a coal containing (say) 6 p.ct. of ash and that made from a coal so cleaned that only the ash inherent in the coal substance is left, approximating 2 p.ct.

I recently had the advantage of investigating the performance of coke made from a coal of this description in co-operation with one of our members, Dr. Rudolf Lessing, who has for some time been well known for his work in connection with coal research and for his long-continued advocacy of clean coal.

It is not necessary for me to describe the plant designed by Dr. Lessing—this he has done himself on several occasions—and you will no doubt be familiar with its operation. It will be sufficient to remind you that in the process the fine dust is first removed from the coal by pneumatic means, and the clean coal is then separated from the foreign matter by immersion in a solution of calcium chloride contained in suitable vessels. The ash content of the clean coal depends on (1) the ash inherent in the true coal substance, and (2) the specific gravity of the calcium chloride solution. This latter may be varied within certain limits, but it is quite possible on a practical scale to clean coal to an ash content of 2 p.ct.

My Directors were so impressed with the growing importance of coke as a domestic fuel and with the advisability of having first-hand knowledge of the improvement to be obtained in its performance when made from properly cleaned coal that they agreed to arrange for a consignment of South Yorkshire slack to be treated in Dr. Lessing's plant. The slack selected was found to give the following proximate analysis:

Moisture	4·27 p.ct.
Volatile matter	32·35 ,,
Fixed carbon	52·30 ,,
Ash	11·08 ,,
	100·00 ,,

This coal when screened consisted of the following gradings:

1 in. to 2 in.	15·8 p.ct.
½ ,, ,, 1 ,,	7·1 ,,
¼ ,, ,, ½ ,,	38·3 ,,
Below ¼ ,,	38·8 ,,
	100·0 ,,

After de-dusting and cleaning the resulting yield was:

Dust	6·3 p.ct., containing	13·96 p.ct. ash
Clean coal	79·4 ,, ,,	1·66 ,, ,,
Refuse	14·3 ,, ,,	48·2 ,, ,,

The proximate analysis of the clean coal was:

Moisture	4·34 p.ct.
Volatile matter	35·79 ,,
Fixed carbon	58·21 ,,
Ash	1·66 ,,
	100·00 ,,

The moisture content in this analysis is of interest as showing that, although the coal has been cleaned by means of a wet process, the percentage of moisture remains practically the same. This is due to the removal of the dust which leaves the coal in such a condition that it dries very easily.

The quantity of coal purchased for the cleaning test was limited, and there was not sufficient available to allow of a trial run for adjusting the plant to the best conditions before the test was carried out. The plant was designed to treat anthracite duff from 0 in. to ¼ in.

A laboratory test showed, however, that the plant could no doubt be adjusted to give, with the particular coal tested, a yield of:

Dust	6·4 p.ct., containing	13·96 p.ct. ash
Clean coal	83·6 ,, ,,	2·14 ,, ,,
Refuse	10·0 ,, ,,	63·70 ,, ,,

This is a more satisfactory yield for practical purposes than that actually obtained on the test run, in which case the percentage of clean coal was too low and that of the refuse too high.

The clean coal was carbonized in Woodall-Duckham vertical retorts, and the resulting coke compared with coke made from similar slack but which had not been treated in the coal cleaning plant. The grading and analysis of the two cokes were as follows:

	Coke from Uncleaned Coal.			Coke from Cleaned Coal.		
	%	H_2O %	Ash %	%	H_2O %	Ash %
Grade 1—						
Over 2 in.	38·3	0·97	7·91	57·2	0·97	3·15
Grade 2—						
1½ in. to 2 in.	26·9	1·34	9·55	24·5	0·68	2·93
Grade 3—						
½ in. to 1½ in.	19·9	1·86	16·19	10·8	0·72	3·18
Breeze—						
Below ½ in.	14·9	1·64	25·78	7·5	3·89	3·63

The increase in the production of large coke and the reduction in the formation of breeze when carbonizing cleaned coal are interesting, but what is perhaps of greater interest is the very large reduction in the ash content of the smaller sizes—the sizes which are supplied as domestic fuel.

The reduction in the make of breeze is accounted for largely by the removal of the fine dust as a preliminary to the cleaning process, and also to the removal of the refuse. These components of raw coal are non-caking and are responsible for the formation of the greater percentage of breeze when, as under normal conditions, they are not removed before carbonization.

The clean coke is harder, slightly denser, and considerably cleaner to the touch than that made from the raw coal, and is altogether a more attractive looking fuel.

During the cleaning process sulphur is removed. The sulphur in the original coal amounted to 1·47 p.ct. and in the clean coal was reduced to 1·14 p.ct. The reduction in the sulphur in the coke was from 1·55 p.ct. to 0·96 p.ct., and is sufficient to lessen considerably the unpleasant taste and smell which is apparent when a coke fire is burnt under a chimney with insufficient draught.

The coke burns excellently in a coke burning grate—such as the "Metro" grate—and is, as may be imagined, an ideal fuel for a domestic boiler.

A comparison was made of its performance in a "Metro" grate with that of a coke made from the unwashed slack and also a sample made from a good South Yorkshire washed mixture.

Great care was taken to see that the slack treated in the cleaning plant was a representative sample of the raw slack raised, and alternate trucks were formed into trains,

one train being despatched to the cleaning plant and the other direct to the Willoughby Lane Works.

The coke tests which follow may be taken to represent very fairly the average results which may be obtained. The South Yorkshire mixture referred to is a different coal entirely, and the results obtained from the coke made from this coal are put in in order to give a standard by which the improvement in the coke from the cleaned slack may be judged. The coke from the washed mixture is free burning and in every way good coke for domestic use. The size of coke used in each test was from 1¼ in. to 2 in., and the moisture and ash contents were:

	H_2O. P.Ct.	Ash. P.Ct.
Clean coke	0·68	2·93
Coke from raw slack	1·34	9·55
Coke from washed mixture	5·0	8·10

Tests on "Metro" Grate.

—	Coke Produced from—		
	Clean Coal.	Unwashed Slack.	South Yorkshire Washed Mixture.
Gas for ignition	9 c.ft.	12 c.ft.	6 c.ft.
Time of ignition	13 mins.	15 mins.	10 mins.
Total time taken to produce hot fire	50 mins.	50 mins.	40 mins.
Total coke charged into grate during test	27 lbs.	23·4 lbs.	22·0 lbs.
Total coke burned	26·2 lbs.	22 lbs.	20·5 lbs.
Period during which hot fire was maintained	8 hours	7 hours	6 hours
Coke consumption (less recovered cinders), lbs. per hour	3·3 lbs.	3·0 lbs.	3·4 lbs.
Fine ash recovered	1·0 lb.	2·9 lbs.	1·6 lbs.
Fine ash, p.ct. of coke used	3·7	13·2	7·3
Bats recovered	*nil*	0·1 lb.	0·02 lb.
Bats, p.ct. of coke burned	*nil*	0·5	0·1

Increase in Gas Production due to Clean Coal.

There was not a sufficient quantity of clean coal available to carry out a reliable gas production test, but there is very little doubt that the capacity of a retort house would be increased at least in proportion to the reduction in the amount of ash in the coal. At the same time the work of clinkering would be made much easier and the loss of combustible matter in the clinker lessened.

The effect on clinkering was clearly demonstrated in tests made on a carburetted water gas plant. A series of tests was carried out for the purpose of assessing the value of clean coke for water gas making. The plant at Ponders End Works was used for these tests, and the makes of gas from the cleaned and uncleaned coke were compared. When using the clean fuel an average of 720,000 c.ft. of gas per diem was made as against 590,000 c.ft. with the uncleaned. Slightly more oil was used owing to the gas supply requirements of the district during the period when the clean fuel was in use, but not sufficient to affect the test seriously. The quantities were 1·78 gallons per 1000 c.ft. in the clean coke test and 1·69 when the uncleaned fuel was in use.

With the uncleaned fuel clinkering was carried out once every 12 hours, although with continued working clinkering would undoubtedly be necessary every 8 hours. This is the normal practice at this works when Durham coal is in use. With the clean fuel the generator fire was not clinkered for 48 hours. The time occupied in clinkering the clean coke fire was 122 minutes after 48 hours—say, 61 minutes per 24 hours—and with the uncleaned coke 55 minutes every 12 hours, or 110 minutes per 24 hours.

To leave the fire for 48 hours was longer than would be advisable under regular working conditions, when fires would probably be clinkered, with a saving in time, once every 24 hours.

I am of the opinion that it would be quite safe to say that the output of a carburetted water gas plant would be increased by at least 20 p.ct. by using the clean fuel.

Summarizing the results of the investigation on clean coal, which has, of course, only been very briefly referred to in this Address:

(1) It was shown that the plant would deal with a South Yorkshire slack and clean it efficiently.
(2) The resulting fuel is ideal for closed stoves and is excellent for consumption in properly designed open grates, although it is not so easy to ignite as coke made from some of the untreated South Yorkshire coals. When ignited, however, it burns freely and leaves practically no ash.
(3) The clean coke is of much harder structure and will stand considerable handling—due to the removal of the friable dust in the preliminary de-dusting treatment and to the absence of shale, which when present promotes a tendency to fracture.
(4) The sulphur content is much reduced.
(5) The gas-making capacity of both coal gas and water gas plants is increased, with a very large reduction in labour on clinkering.
(6) It is possible to convert a dirty slack into a material from which a first-class coke can be made.

I have said that it is essential that we should either be able to depend on the composition of the coal we purchase or else we should be in a position to control its quality by treatment at the gas-works.

There are, however, difficulties in the way of treatment at the works. Approximately 6 p.ct. of dust and 10 p.ct. of refuse remain to be disposed of. The dust is practically fine enough for use on pulverized fuel burners without further treatment, but the refuse presents a difficulty for which it is not easy to see a solution. This refuse can be used in suitably designed boiler plants for steam raising. Similar refuse is in fact being used for this purpose to-day. If freight charges have to be incurred in connection with refuse it becomes very expensive boiler fuel, and obviously the proper place at which coal should be cleaned is the colliery, whose owners are in a much better position to dispose of the dust and to handle the refuse than are gas undertakings.

The fact that a dirty slack can be converted into an attractive fuel which would command a higher price should encourage colliery owners to investigate the possibilities of coal cleaning, and we on our part should support those who do make genuine attempts to offer us cleaner fuel of consistent quality.

A small number of coal owners are willing to sell their coal on a guaranteed maximum ash content basis. Although the percentage of ash has not yet been reduced in these cases to such a low figure as in the case of the slack I have described, at the same time it is encouraging to find coal owners who have sufficient confidence in their cleaning processes to guarantee the quality of their products.

"Dri-Gas" and Naphthalene Washing Plant.

We must also look for improvements in ancillary plants and processes. One of the most interesting recent developments of this nature was the introduction of a practical process for the partial drying of gas, the first plant for this purpose being installed at Taunton Gas-Works in 1926. This process was admirably described by Mr. C. Harris in a paper which he read before this Association in November, 1927; and there is no need for me to add to his description.

At the same time a few notes on the cost of working a rather larger plant, and on the results obtained, may not be out of place.

"Dri-Gas" and naphthalene washing plants having a capacity of 3 million c.ft. per diem and 16 million c.ft. per diem were installed at Ponders End Works and Willoughby Lane Works respectively in 1929, and since November of that year the whole of the gas supplied by my Company has been treated in these plants. The cost of operating is small, as will be seen from the following tables.

Table 1 gives the costs in connection with the 16 million c.ft. per diem plant at Willoughby Lane, and Table 2 those of the 3 million c.ft. per diem plant at Ponders End.

Table 1.

	£	s.	d.
Capital cost of installing 16,000,000 c.ft. per diem "Dri-Gas" and naphthalene washing plant, including plant, foundations, buildings, connections, and pumps	16,000	0	0
	£	s.	d.
Annual charges—			
Interest at 6½ p.ct. per annum	1040	0	0
Depreciation at 5 p.ct. per annum	800	0	0
Calcium chloride renewal—			
10 tons at £6 10s. / 4½ ,, ,, £8 5s.	102	2	6
Steam, 2s. per 1,000,000 c.ft.	350	0	0
Labour operating plant (⅛th of man's time per shift)	96	14	10
Repairs and maintenance—			
Wages	27	1	10
Materials	77	1	3
Oil for filming gasholders (10 p.ct. of 9400 gallons at 4½d. per gallon)	17	12	6
	£2510	12	11

The gas passed through this plant in twelve months (corrected to N.T.P.) was 3500 million c.ft., or 17,500,000 therms.

The cost of the combined process of partial drying and

washing for naphthalene was therefore 0·17d. per 1000 c.ft., or 0·034d. per therm.*

TABLE 2.

	£	s.	d.
Capital cost of installing 3,000,000 c.ft. per diem "Dri-Gas" and naphthalene washing plant, including plant, foundations, buildings, connections, and pumps	5000	0	0
	£	s.	d.
Annual charges—			
Interest at 6½ p.ct. per annum	325	0	0
Depreciation at 5 p.ct. per annum	250	0	0
Calcium chloride renewal—			
10 cwt. at £8 5s. per ton	4	2	6
Steam, 2s. per 1,000,000 c.ft.	45	4	0
Labour operating plant (5s. per diem)	91	5	0
Repairs and maintenance—			
Wages	5	0	0
Materials	15	0	0
Oil for filming gasholders (10 p.ct. of 2400 gallons at 4½d. per gallon)	4	10	0
	£740	1	6

The gas passed through this plant in twelve months was 452 million c.ft., or 2,260,000 therms.

The cost of the combined process of partial drying and washing for naphthalene was therefore 0·42d. per 1000 c.ft. or 0·083d. per therm—a little more than double the costs incurred on the larger plant.*

As against these costs there are considerable savings in the expense of clearing stopped services and of pumping syphons. The annual number of services in which stoppages occurred due to naphthalene, water, or rust over the period Jan. 1, 1925, to Dec. 31, 1930, amounted to:

1925	5045	1928	9,120
1926	8586	1929	24,547
1927	5553	1930	4,546

The Ponders End "Dri-Gas" and naphthalene washing plant was put to work in September, 1929, and the Willoughby Lane plant on Nov. 11, 1929.

A remarkable rise in the number of stoppages occurred immediately prior to the putting to work of the Ponders End Plant, and continued for some time. This rise was not due primarily to the operating of the process, but was no doubt caused by climatic conditions. The abnormal increase commenced before the plants were put into operation. It is possible, however, that the naphthalene-free gas distributed after November, 1929, picked up naphthalene which had already been thrown out in the mains and carried it forward, only to be deposited again later in the consumers' services.

An improvement occurred in August, 1930, at a season of the year when it was not expected, and the total number of stoppages cleared during 1930 showed a reduction on previous years.

While the number of stopped services does not always vary inversely as the gallons of oil used, at the same time it is generally accepted that, other conditions being equal, an increase in the quantity of oil used should result in a decrease in the number of services stopped.

In 1930 a reduction in the oil corresponded with a reduction in stopped services. The elimination of naphthalene is mainly responsible for the latter reduction. No process for the extraction of naphthalene was in use at Tottenham before the combined plant was put to work. Paraffin was atomized and introduced into the gas stream at the outlets of the station governors, but this process was not found to be successful, probably on account of the velocity at which gas left the works at peak loads and the distance it had to travel. It is safe to say that the gas leaving the works was nearly always saturated with naphthalene.

Since the combined plant was put to work a picric acid test will not indicate the presence of a trace of naphthalene after gas has bubbled through the test solution for a week. In the combined plant the gas is partially dried before being washed for naphthalene, and undoubtedly the naphthalene recovery process is in consequence made much more effective.

A large percentage of the stoppages during 1930 and those so far cleared during 1931 was found to be due to rust. This rust is now removed as a very fine dry powder —very different from the condition of the rust prior to the distribution of dry gas, when it was removed in a wet, scaly condition—very often having blocked a service pipe solid, necessitating a re-lay. It has been established by the Wrought Iron Tubing Committee of the Institution of Gas Engineers that corrosion cannot take place in the absence of liquid moisture. The fine dry rust now being removed must therefore presumably have been formed by corrosion which took place before 1930, and it is reasonable to expect that, once the existing rust has been cleared from the mains and services, no more stoppages will occur.

It is highly important to remove this rust entirely from the system by suction instead of by blowing it back into the mains with a force pump. If the latter practice is continued when rust is present as a dry powder it will not be long before that rust appears in another service.

SUCTION PLANT FOR CLEARING SERVICES.

A simple suction plant was devised and constructed for clearing services by Mr. R. J. Wilson, Mechanical Engineer at our Willoughby Lane Works. This plant has answered its purpose admirably, and is shown in fig. 2.

The formation of dry rust was anticipated before the "Dri-Gas" plant was put to work, and connections were prepared at selected points on the district so that paraffin could be sprayed into the gas stream if desired, in order to damp down the dry rust. This has been done regularly, but so long as the number of stoppages due to rust does not reach unmanageable proportions it is questionable whether the better policy would not be to stop the district spraying entirely, allowing the dry rust to go forward more quickly. Although this would mean a temporary increase in the number of stoppages, it would hasten the time when the mains system would be entirely cleared.

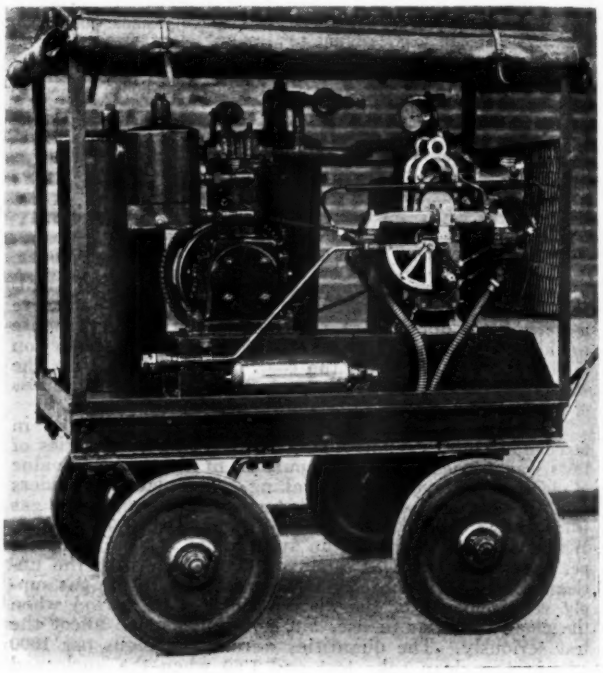


Fig. 1.—Portable Spraying Plant.

Fig. 1 illustrates one of the simple portable spraying plants which are used on the district and which were assembled at Willoughby Lane. Down pipes fitted with suitable sprays are connected to the district mains at selected points. At adjacent points connections are fixed for supplying gas to the compressor engine on the portable spraying plant. The engines used are motor cycle engines. These plants are carried between the various points on the district on 1-ton Morris lorries.

In order to ascertain the difference in cost between the "force pump" and "suction" methods of clearing services, the costs were taken out of several typical instances of each method; and it was found that, whereas with the force pump the cost averaged 2s. 9d. per service, with the suction plant it was only 1s. 3d.

While these figures may not represent the total costs, as every overhead charge is not included, they are comparable in that they include the actual time spent on the job in each case, together with the time lost in travelling from job to job, and, in addition in the case of the suction plant, the interest on capital, depreciation, repairs, and running costs.

The average number of stopped services cleared per annum for five years prior to 1930 was 10,570. At 2s. 9d. per service the annual cost would be £1453.

During 1930 the stoppages numbered 4546. The cost of clearing these with the suction plant at 1s. 3d. per service is £284, a reduction of £1169.

I appreciate that these figures are open to criticism, as

* These costs will be reduced as the load on the plants increases. The average quantity of gas treated on the 16 million plant was 9·6 million c.ft. per diem, and on the 3 million plant 1·24 million c.ft. per diem. The costs of pumping the gas oil used for the extraction of naphthalene are included in the above tables, but no charge has been made for the use of the material itself, as this is recovered and used on the carburetted water gas plant.

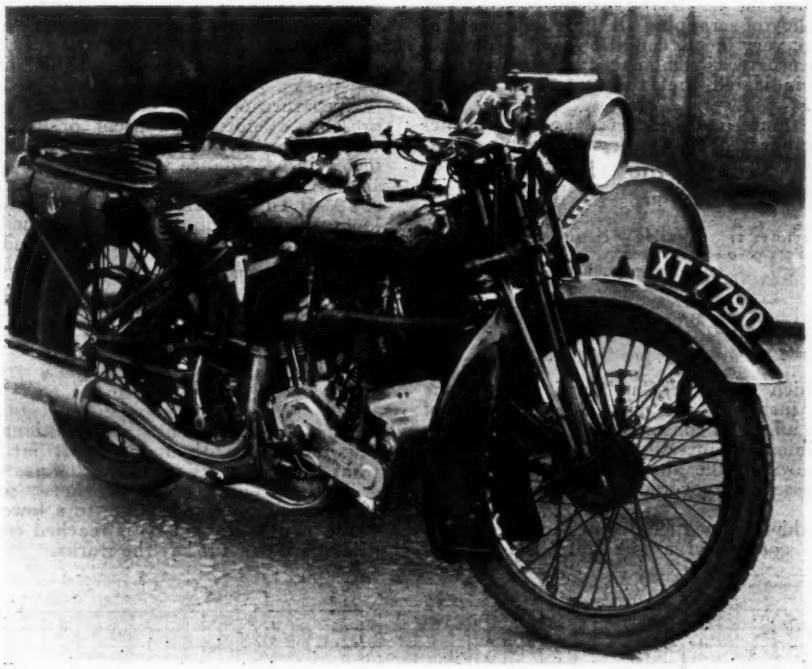


FIG. 2.—SUCTION PLANT.

it may be argued that the suction plant is as much responsible for the decrease in cost as is the reduction in the number of services cleared. I doubt very much, however, if the suction plant would have operated successfully on services containing rust in the former damp and sealy condition. The dry powdery rust now found is quite easy to handle, and very few cases occur with which this plant is unable to deal.

Another criticism may be that the stoppages in 1929 were abnormal, and should not be included in an average for five years; but these stoppages did occur, and I have endeavoured to show the actual position both before and after the installation of the plants.

I believe that in the course of a year or two our troubles from stopped services will cease entirely, in which event we shall benefit by a still further reduction in costs.

In addition to the stoppages in consumers' services there also occurred stoppages in public lamp services which should be taken into consideration. These are not generally given so much prominence as stoppages in consumers' services. They are not brought to our notice with the same force as are the latter. On keeping a record of public lamp stoppages, we found that they represented a serious item.

Table 3 is a record of stoppages in lamp services month by month, together with the numbers of lamps in commission for the years 1928, 1929, and 1930.

TABLE 3.—*Number of "Stopped" Services on Public Lamps.*

	1928.		1929.		1930.	
	Stopped Services.	No. of Lamps.	Stopped Services.	No. of Lamps.	Stopped Services.	No. of Lamps.
January	124	6608	155	7308	135	7579
February	93	6623	7,098	7327	339	7593
March	89	6631	73	7345	148	7617
April	135	6662	86	7367	104	7672
May	107	6697	65	7379	163	7702
June	138	6711	124	7402	301	7721
July	162	6727	188	7423	310	7744
August	249	6737	279	7428	280	7757
September	294	6771	432	7439	279	7772
October	361	6799	624	7479	149	7804
November	183	6831	1,100	7501	82	7833
December	169	6849	342	7540	60	7845
Totals	2104	..	10,566	..	2350	..

The large increase in the number of lamps in lighting from December, 1928, to January, 1929, is accounted for by amalgamation with the Waltham Company.

The 7098 stoppages in February, 1929, include 6739 frozen services which occurred during the particularly severe weather from Feb. 14 to 22.

With records only available for three years, one of which years includes unusually severe weather, it is difficult to arrive at an accurate average. The numbers for 1930 show an increase over 1928. This is partly accounted for by the additional 996 lamps in operation in 1930. I believe that when the dry rust is entirely removed there will be no stoppages at all on the public lamps, and as these cost 1s. 3d. per service to clear it is fair to credit the new process with (say) 1s. 3d. per service in respect of 2000 services—a total of £125 per annum.

Another saving which may be placed to the credit of the "Dri-Gas" and naphthalene washing plant is that of paraffin. Paraffin was used in sprays on the gasholder inlets at the two works, as well as on the outlets of the district governors. The use of paraffin has now been stopped entirely at these points; and although this is set off to a certain extent by the small quantity used on the district sprays, this latter quantity is only a small proportion of the former, and its use will be discontinued entirely in a short time. When this happens the reduction in the use of paraffin will be equivalent to £1500 per annum.

Another saving has been effected by a very considerable reduction in syphon pumping. For the five years prior to 1930, this had cost approximately £1000 per annum. Now the cost is only at the rate of £500 per annum; and this cost is likely to decrease still further as the quantity of liquor to be pumped diminishes. The expense in connection with syphons will not be eliminated entirely, as it will still be necessary to examine the syphons periodically.

Fig. 3 illustrates the quantities now pumped from all syphons, and shows the decreases which are taking place. This diagram also illustrates how a broken main in water-logged ground is disclosed. Apart from any other reason, the possibility of broken mains makes it imperative to examine syphons periodically.

The reduction in syphon pumping is remarkable, and appears even more so when one considers the quantity of water which would be deposited from saturated gas owing to a temperature drop of from (say) 58° Fahr. to 44° Fahr. between the outlet of the station governors and the inlet to consumers' meters. During December, 1930, and January, 1931, 729,195,000 c.ft. of gas were sent out from our two works. At 58° Fahr. this quantity of gas if saturated would have contained 61,395 gallons of water vapour. With a 14° Fahr. drop in temperature, 25,112 gallons would have been deposited. Actually 899 gallons were pumped from the syphons during this period, this quantity including the surface water which had entered syphons through broken mains.

A temperature drop of 14° Fahr. was adopted for the above calculations after taking temperatures in the gas mains at 36 representative points on the district, and comparing the average of these with the temperature at the outlet of station governors.

I am not able to say what may be the effect of "Dri-Gas" on the life of meters or on their repair costs.

For several years before the gas-drying process was adopted we had pursued a policy of scrapping all three-light meters. Our meters were in very good condition and of ample capacity when the process was commenced, and subsequent experience has not indicated that the meters have been affected in any way.

Summarizing the annual costs incurred and the reductions in expenditure effected by the drying and naphthalene washing processes we have:

Costs.	£	s.	d.	Reduced Expenditure.	£	s.	d.
Willoughby Lane plant	2510	12	11	Clearing consumers' services	1169	0	0
Ponders End plant	694	9	0	Clearing public lamp services	125	0	0
				Paraffin	1500	0	0
				Syphon pumping	500	0	0
	£3205	1	11		£3294	0	0

The object for which the "Dri-Gas" and naphthalene washing plant was installed was not to lessen costs of manufacture, but to afford to consumers an additional service; and in my opinion the installation is amply justified financially if, as shown in the above table, the costs incurred by the processes are covered by reduced expenditure.

There is an item which is not included in the above table but which must be considered a loss until the method originally prescribed for measuring gas when testing for calorific value is amended.

The description of calorific value in the Gas Regulation Act, 1920, Section 1 (7) reads:

> The calorific value of gas means, for the purposes of this Act, the number of British thermal units (gross) produced by the combustion of one cubic foot of the gas measured at sixty degrees Fahrenheit under a pressure of thirty inches of mercury and saturated with water vapour.

This sub-section has been amended by the Gas Undertakings Act, 1929. The Schedule to that Act amends Subsection (7) to read:

> The calorific value of gas means, for the purposes of this Act, the number of British thermal units (gross) produced by the combustion of one cubic foot of the gas measured at sixty degrees Fahrenheit under a pressure of thirty inches of mercury and (except as otherwise prescribed by the gas referees) saturated with water vapour.

In consequence, until the Gas Referees prescribe otherwise, gas which is distributed partially dried and having a dew-point of approximately 40° Fahr. must be saturated with water vapour before combustion in the calorimeter. The calorific value so obtained is not a true indication of the quality of the dry gas supplied to the consumer, who is charged on the lower and incorrect value, the loss to the undertaking varying with the degree to which gas is dried.

A series of determinations has shown that gas has been discharged from our works during the year 1930 at an average temperature of 60° Fahr. with an average dew-point of 40° Fahr. There has only been an increase of 1° Fahr. in the dew-point at a distance of four miles from the works. The vapour pressure of moisture in gas at a temperature of 41° Fahr. is 6·6 mm. of water, which represents a moisture content of 0·87 p.ct. The calorific value of gas having a dew-point of 41° Fahr., which, when tested in accordance with the Gas Regulation Act, 1920, is said to have a calorific value of 500 B.Th.U., is actually 504·35 B.Th.U. The result of this loss is that every cubic foot of gas distributed has contained 4·35 B.Th.U. more than would have been necessary had it been tested correctly. Assuming that this added value has been obtained by enrichment with gas oil costing 4d. per gallon, and that each gallon has enriched 1000 c.ft. of gas by 100 B.Th.U., the loss on the 3952 million c.ft. (at N.T.P.) sent out during the year 1930 amounts to:

$$\frac{3,952,000,000 \times 4{\cdot}35 \times 4}{100 \times 1000 \times 240} = £2865$$

This sum represents an additional value which consumers obtain without payment, but it is not all extra to what they were given before dry gas was distributed.

The bulk of the liquor previously pumped from syphons was deposited from gas due to a lowering of temperature. Consequently the gas as it reached consumers' meters was drier than when it left the works.

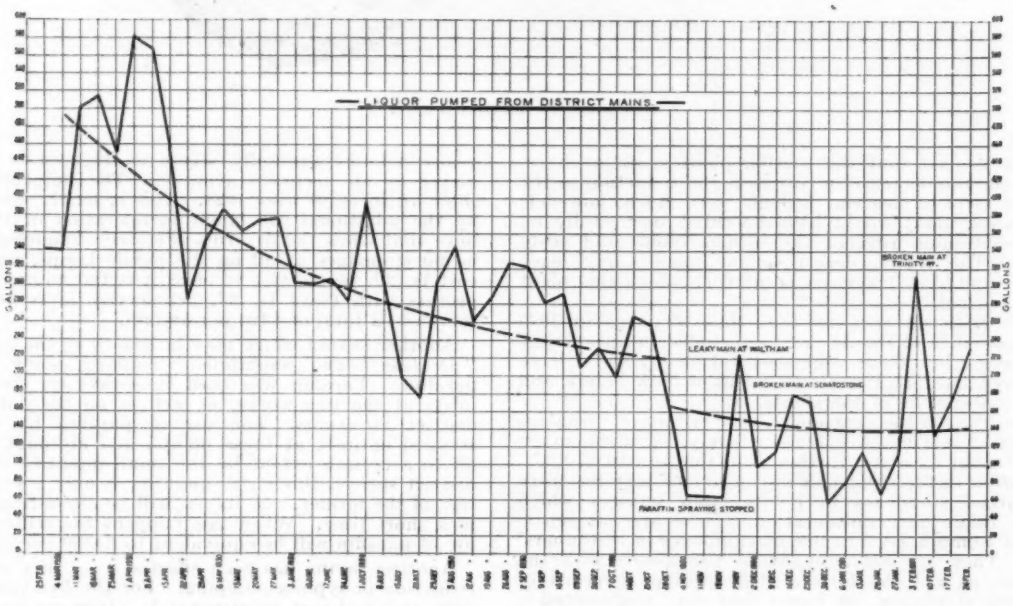


FIG. 3.

It may be argued that, although the average dew-point of the gas leaving the works was reduced to 40° Fahr., the temperature in the mains may have fallen below this figure in some districts, in which event water would be deposited.

In order to see whether this was likely to happen, a series of soil temperatures was taken at a depth of 4 ft. and 2 ft. below the surface of the ground. These temperatures, together with the dew-points of the gas distributed, have been plotted, and are shown in fig. 4. From the resulting graphs we are satisfied that the soil temperature does not fall below the dew-point of the gas.

The temperature of gas in the distribution mains has also been taken at 36 representative points. These temperatures were taken by lowering thermometers into the syphon pipes, which, together with the syphons, were quite dry. The lowest temperature recorded was 42° Fahr. and the highest 48° Fahr., the average being 44° Fahr.

Insufficient readings have been taken to arrive at a definite conclusion, but these are being continued; and I believe that they will show that the temperature of the gas after leaving the works does not fall below the dew-point to which it is dried.

What is perhaps more striking evidence of this is the gradual drying up of the syphons, to which I have already referred. The graph in fig. 3 shows that the water now being removed is trifling in quantity and is decreasing.

While we are anxious and willing to take all possible steps to improve the supply to our consumers, we are entitled to be paid for the gas we deliver, and it is encouraging to know that the Gas Referees are prepared to consider such amendments to prescriptions for testing as

will ensure fair treatment to those undertakings who have gone to the expense of installing " Dri-Gas " plants.

Publicity Given to Competitors.

The Gas Industry is a progressive industry, and it has progressed and is progressing on account of the efforts made by those engaged in it and by their eagerness at all times to improve the methods of manufacture and distribution in order to afford to consumers of gas an increasingly efficient service.

The Industry has been built up on principles which are fundamentally sound, and fortunately does not need to be lectured and taught its business by Cabinet Ministers who, instead of doing their jobs as statesmen, take unfair advantage of the office to which they have been called and endeavour to impose their own ideas on a competitive industry, whether those ideas be economic or otherwise. Although we do not wish such methods to be adopted in our Industry, and are sorry to see them applied to our competitors, at the same time the unfair publicity and assistance which is given them does undoubtedly have a temporary effect on our business in certain directions.

I very much doubt if the electrical experts are as optimistic as the Minister of Transport. Sir Frank Heath, the President of the British Electrical and Allied Industries Research Association, speaking at the Savoy Hotel on Feb. 13 last, is reported to have said:

> In one London suburb electricity was so cheap that a considerable number of electric cookers had been installed, but, added Sir Frank, 60 p.c. of the people who have installed these cookers have installed a gas ring as well. I leave you to draw the conclusion.

Our Industry has occupied an important place in both the public and the private lives of the people of this country for over one hundred years. In many homes gas is indispensable. Imagine the howls of protest which would go up if failures in the supply of gas were as frequent as failures in the supply of electricity. Yet the latter appear to be accepted as a matter of course.

Mr. Archibald Page, Chief Engineer of the Central Electricity Board in 1927, in his Presidential Address to the Institution of Electrical Engineers, said:

> As regards continuity of service, though we may be justly proud of the fact that our standard of excellence in this respect is unequalled throughout the world, to secure 99·9 p.c. of continuity involves much greater capital expenditure than does (say) 99 p.c. While, therefore, in the business and shopping centres of large towns nothing but the best is good enough, this policy need not be universally adopted, such luxuries as duplicate transformers, switchgear, and cable not being necessary everywhere.

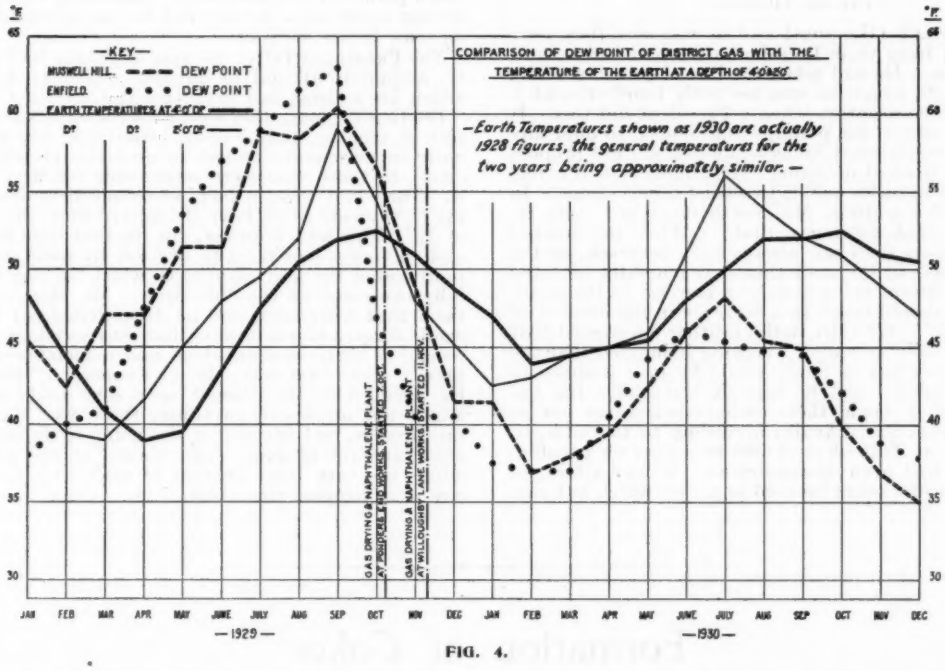
Even though " in the business and shopping centres of large towns nothing but the best is good enough," failures in supply in these areas are not infrequent.

We aim at 100 p.c. freedom from breakdown in supply, and generally we are successful. Such failures as there are are infrequent and occur in isolated services not affecting whole districts. They are due to the deposition of naphthalene, water, and rust, all of which can now be removed successfully. Any failure due to one of these causes gives some notice, and if it is reported soon enough can be dealt with before the stoppage is complete.

The reliability of gas supply is one of its great assets, and any process which assists in maintaining or improving this reliability is worthy of the closest consideration.

Co-operation with Contractors and Appliance Manufacturers.

I hope that in the future we shall see much closer co-operation between the makers of gas manufacturing plants, makers of gas consuming appliances, and those engaged in the gas manufacturing and distributing branches of our Industry. The alterations to the by-laws of the Institution of Gas Engineers have done much to help in this direction, and it is pleasing to see that many gentlemen engaged on the contracting and appliance manufacturing side of the Industry have taken advantage of the facilities offered to them and have become Members of the Institution of Gas Engineers. Their membership must prove of advantage both to themselves and to the Institution. Ultimately the whole Industry will benefit. There is still room for development in the different uses to which gas may be put in domestic dwellings and in industry. Processes for which gas has not yet been tried should prove profitable outlets for additional consumption when suitable appliances are designed for their use and appliances which are available to-day will prove better gas sellers when improvements in their design and manufacture resulting in increased efficiency and reduced selling cost make possible their more universal use.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—KEY—
MUSWELL HILL. — — — DEW POINT
ENFIELD. • • • DEW POINT
EARTH TEMPERATURES AT 4'0" DP ——
COMPARISON OF DEW POINT OF DISTRICT GAS WITH THE TEMPERATURE OF THE EARTH AT A DEPTH OF 4'0" BSG
—Earth Temperatures shown as 1930 are actually 1928 figures, the general temperatures for the two years being approximately similar.—
GAS DRYING & NAPHTHALENE PLANT AT ENFIELD PRESSURE STARTED 2 OCT.
GAS DRYING & NAPHTHALENE PLANT AT WILLOUGHBY LANE WORKS STARTED 11 NOV.
JAN FEB MAR APR MAY JUNE JULY AUG SEP OCT NOV DEC
—1929—
JAN FEB MAR APR MAY JUNE JULY AUG SEP OCT NOV DEC
—1930—

FIG. 4.

While each of us has his own work to do in his own particular sphere, the more we know of the problems which have to be faced by those engaged in other branches of the Industry, the better. It is important to those of us making and selling gas that the appliances we purchase should be economical, reliable, efficient, and of attractive appearance; but it is of equal importance to the makers of those appliances that the gas we supply should be of constant quality, composition, and pressure, and that we should have available organizations for the satisfactory maintenance of the appliances. When we sell an appliance to a consumer the transaction is not completed—it has only just commenced. We expect that appliance to be a source of revenue from the sale of gas for many years to come. The maker in his turn is entitled to expect that an adequate supply of gas will be available for his appliance, which he hopes will prove sufficiently attractive in use to influence further sales. We are all working in a common cause, and it is impossible to divorce the interests of one party from those of the other. The closer the co-operation which

exists between us, the better we shall be able to meet competition, whether this be fair and based upon sound economic principles, or whether it be uneconomic and unfairly influenced by Government boosting.

In conclusion I should like to thank you once again for electing me as your President, and I must also express my thanks to my Chairman, Mr. Henry Woodall, M.Inst.C.E., M.Inst.Gas E., and Directors for kindly enabling me to undertake the duties of the office.

Gas Referees' Amendment.

The President exhibited at the meeting samples of graded cokes from both cleaned and uncleaned coals. After reading the statement that: "While we are anxious and willing to take all possible steps to improve the supply to our consumers, we are entitled to be paid for the gas we deliver, and it is encouraging to know that the Gas Referees are prepared to consider such amendments to prescriptions for testing as will ensure fair treatment to those undertakings who have gone to the expense of installing 'Dri-Gas' plants," he added: "Since writing this, the Gas Referees have agreed to amend our prescription, and we start to operate with the amended prescription from April 1. But it was necessary to convince them by figures that the consumer was getting gas as dry as when it left the works."

Vote of Thanks.

Mr. C. F. Botley (Hastings) said he was sure they were all agreed that from their President they had had a most valuable address. He had taken the line of going critically into matters with which he was perfectly familiar, and it was helping the Association when a President did this. It was not usual, and it was perhaps ungracious, to offer any criticism on a Presidential Address, and he did not propose to do so on the present occasion. He would, however, like to be permitted to make one or two brief observations. In one portion of his address, Mr. Smith remarked, with regard to carburetted water gas, that: "While the number of stopped services does not always vary inversely as the gallons of oil used, at the same time it is generally accepted that, other conditions being equal, an increase in the quantity of oil used should result in a decrease in the number of services stopped." He (Mr. Botley) rather questioned that this was "generally accepted," because it implied that the carburetted water gas as made would be in a position to dissolve naphthalene, and he himself was under the impression that they made their carburetted water gas as permanent as coal gas. Again, according to the address, they had spent at Tottenham £1500 in a year on paraffin, and the result had been disappointing. It was a fact, of course, that paraffin could be used in a way which left rust and naphthalene out of the picture. The President pleaded for individual effort, and this should be commended to those present, because unfortunately there was too great a tendency sometimes to depend upon the work of Associations, with resultant slackness of individual effort. The President expressed the hope that in the future they would see much closer co-operation between the makers of gas manufacturing plants, makers of gas consuming appliances, and those engaged in the gas manufacturing and distributing branches of the Industry. The advantages of this co-operation were in evidence at the recent British Industries Fair. In this connection he would suggest a line of thought: One could not help noticing that some of the appliances of their competitors were very cheap as compared with gas appliances. Whatever their quality might be, they were because of their cheapness attractive to thoughtless people, and perhaps secured a sale in preference to gas appliances which would give better service.

Mr. L. J. Langford (Tunbridge Wells), in seconding the vote, said the President had given them just such an address as they would have expected of him—one containing ample details of his experiences and proof that he had the courage to adopt processes likely to prove of advantage. They must all have been delighted to hear that he had induced the Gas Referees to make an amendment in regard to the calorific value of dry gas. Others would look forward to securing a similar amendment, when putting down plants of this character. Both coal cleaning and gas drying would provide material for an admirable discussion on some future occasion.

The President (after the vote of thanks had been carried by acclamation) said he greatly appreciated the way in which his address had been received. With regard to the "Dri-Gas" plant, this worked so smoothly, without any sort of trouble, that he was afraid the majority of them quite unconsciously forgot to give the proper amount of credit to those who were responsible for first introducing it. The plant was, in fact, so simple that one was apt to say "Anybody could have thought of that; there is nothing in it." This was, however, not the first time that chemists and engineers had tried to dry gas by some means, but it represented the first plant with which anyone had successfully overcome all the difficulties. Mr. Henshaw was with them that afternoon, and he (the President) was sure he would forgive him if he said that they owed a very big debt to one of their own members and a member of Mr. Henshaw's staff—that was, Mr. C. Cooper. ["Hear, hear."] He would like Mr. Cooper to realize that, though they might not often say anything, those who were adopting this process, and felt that it was going to do the Industry a great amount of good, remembered at the back of their minds the very large amount of work that was put in by him in developing this plant.

Formation of Cokes

Discussion on paper by Mr. John Roberts, before the Institute of Fuel, an extract of which was published in the "JOURNAL" last week

The Chairman (Dr. E. W. Smith, C.B.E.) said he had heard it stated recently that the subject of blending and coke examination had become hackneyed, and that few people attempted to discuss it further with usefulness. He could not agree with that view, however. There were definitely four different interests which had much to gain from the study of this so-called hackneyed subject. First, the Gas Industry could very well improve its coke; secondly, the coke-oven industry would do well by studying to a greater extent than it had done the problem of coke production and the conditions that influenced coke production; thirdly, the low-temperature carbonization industry could avoid many failures by studying the nature of the material it was trying to carbonize before promising to carbonize in particular installations material for which they were not suitably designed; and, fourthly, and most important of all, the ordinary domestic consumer was supremely interested in anything which would improve the quality of solid smokeless fuels. The question which arose was as to what extent such suggestions as Mr. Roberts had made could be applied economically. It was fairly certain that a great deal of unremunerative work would have to be done before the average gas undertaking, coking plant, or even low-temperature carbonization plant could make any headway towards improvement. A quantity of 40 million tons of coal was being used per annum for domestic purposes in this country; it could not be reiterated too frequently that it was a crime that this country—which claimed, and felt justified in claiming, to be among the most civilized in the world—allowed the use of smoky fuels in domestic appliances. Gas-works coke and coke-oven coke, if properly screened and graded and reasonably dried, and having a reasonably low ash content, could be used to advantage under many conditions, but was not yet as good as was necessary to effect its universal use. The gas and coke oven industries, by slightly modifying their conditions and—what was perhaps more important still—by developing a proper sales organization, could secure a financial return the extent of which had not yet been appreciated by them.

Eliminating the Plastic Layer.

Mr. Harald Nielsen, who commented that there were as many recipes for coke manufacture as there were cooking recipes in Mrs. Beeton's book on food, said it seemed to him that, with the march of science, they were getting further away from the subject, and he suggested that they should look at the problem in a somewhat different light. Why not treat the coal by prior distillation, and so obtain the oils which were so badly needed in this country, briquette the residue with pitch or with the oil fraction which was not wanted for any other purpose, and then carbonize the briquettes at high temperature? He admitted that this would involve something of a dual process, but he pointed out that they could utilize the waste heat from the high-temperature ovens for the preliminary treatment and the carbonizing of the briquettes. Judging from his experience, each high-temperature oven unit would be able to increase its capacity by from 20 to 30 p.ct., since there would be no plastic layer in the oven to contend with. They would have no breeze, and they would have gone a good step towards the solution of the national oil supply problem. In the future, coke would be manufactured from any coal most

conveniently situated, by methods which would enable the operator to produce just the article for which the demand existed at the moment, and thereby establish a more elastic industry, far better able to meet the prevailing market conditions. If the method he had suggested were adopted, they would not be dependent upon the fickle nature of the coking constituents or of the raw coal, since they could, by the admixture of more or less pitch, obtain the results required.

Path of Travel of Volatiles.

Mr. G. A. Hebden, in a written communication, referred to the section of the paper dealing with the path of travel of volatiles, and said that Mr. Roberts' statements in that connection appeared to be amply proved by the results obtained in the recent still process of withdrawing the gases from the oven charge. In this process several perforated pipes were inserted in the top of the charge to a certain depth, and the gas was drawn off through them. In this way not all the gas passed outward on to the wall face or into the sometimes overheated space above the oven charge, and in consequence there was an alteration in the characteristics and quantity of the volatiles produced. The method of gas withdrawal might well have an important bearing on the trend of future development. While he agreed in part with Mr. Roberts' contention that the charge was subject to coking on the top, it must be remembered that it was not under the same influence as the sides, being comparatively frothy and spongy, and, therefore, not calculated to give the same resistance to the passage of the gas.

Coke Breeze.

Dr. A. T. de Mouilpied, who emphasized the danger of dependence upon the use of imported oil fuel, said there had been a number of very good examples, and some brilliant examples, of what could be achieved in the texture, the character, the formation, and the density of coke by means of blending. But how much did they know so far of what really happened when they heated two coals together, or coal and coke, or coal and semi-coke? This problem of blending seemed to offer an extraordinarily fertile field for investigation. He recalled that the Chairman, in a paper on "Coke Breeze" presented to the Institute of Fuel at its Annual Conference in 1930, had discussed the blending of breeze with coal for carbonization. In that paper Dr. Smith had fixed a limit of 5 p.ct. of high-temperature coke breeze in the blend, and presumably that limit was dictated by considerations other than the quality of the coke—probably the characteristics of the retorts, or throughputs, or something of that kind. Dr. de Mouilpied mentioned this because quite recently, in the North of England, he had seen an admirable coke—robust, of fine texture, and homogeneous—which had been produced from a blend of strongly coking coal and no less than 30 p.ct. of high-temperature coke. There was also the question of blending coal with semi-coke, which contained a good deal more volatile matter than did high-temperature coke. In one example, in which the coal, which was very unsuitable in itself for making metallurgical coke, was blended with another coal, and had also been blended with high-temperature coke and with semi-coke respectively, by far the best results were obtained by blending with low-temperature semi-coke. The resulting metallurgical coke was similar to the best Ruhr cokes. It was quite possible to produce low-temperature semi-coke containing 13 or 14 p.ct. of volatile matter; and he suggested it was possible in those cases that this volatile matter, all of which was gaseous if the coke was further heated, continued to come out of the structure by a series of small explosions, thus keeping active the micro-cellular structure. It then became absorbed, and the strongly coking coal (with which a semi-coke was blended), when distilling, filled up the small cells which were kept active, and that resulted in the production of a very homogeneous and strong product.

A feature for which he could offer no explanation was that where a strongly swelling coal was mixed with a semi-coke of varying volatile content, the results obtained were much worse than if the volatile matter was distributed homogeneously throughout the mass. If one used a semi-coke with an average volatile content of 10 p.ct., some of which semi-coke might contain 15 or 20 p.ct. of volatile matter and some only 5 p.ct., the resulting product would be much poorer than could be obtained if the semi-coke used in the original blend had been one containing 14 p.ct. of volatile matter, with a maximum variation of ± 1. This suggested a possible field of inquiry. If they could make high-temperature coke more satisfactorily than it was made at present, then surely this very important problem of securing a clean atmosphere would be solved.

The Chairman, replying to the reference made to his paper on coke breeze, and the statement contained therein to the effect that the maximum quantity of breeze in a blend for carbonizing was 5 p.ct. on the coal, pointed out that that paper was an attempt to determine methods for disposing of coke dust and coke breeze, and the material he had in mind was the coke dust, which was rarely met with in quantities greater than 5 p.ct. Further, this small coke usually had a very much higher ash content than had the normal coke, and it was inadvisable to put a lot of it into the blend and so increase the ash content in the coke resulting from carbonization. He added that Mr. Roberts had carried out experiments with the "Homite" process using 15 and 20 p.ct. of coke dust, and there had been no difficulty, provided the right amount of binder was present in the coal.

Blending Coal and Coke Breeze.

Mr. F. Puening (the Koppers Company, Pittsburgh) acknowledged that in the course of his tests he had been assisted considerably by the information Mr. Roberts had published concerning the use of blends containing coke breeze. He had then gone further, and had found that the degree of pulverization of the coke breeze which was added was a matter of great importance. For example, when using a blend of coal and high-temperature coke breeze, success was achieved if the breeze was finely pulverized so that each particle was completely embedded and absorbed; but success was not achieved if the breeze was coarse. In the course of attempts which had been made in America to improve low-temperature coke, they had resorted to compacting and tamping, and it was found that the weight of the charge—which was from 45 to 60 lbs., as an average—could be increased if the material was tamped efficiently. Excellent low-temperature cokes had been made in that way. Further, it had been found that, when the coal was preheated, the fine particles of coke would slide more readily into the voids, and the charge was thus rendered very much more compact. The temperature must not be raised beyond about 250° Fahr., however, because at temperatures above that the individual particles of coal expanded, so that the weight of a charge of given volume was again reduced. Coal reached its maximum density at about 250° Fahr.; at that stage the moisture had been driven out, but the expansion of the individual particles of coal had not begun. By using blends of coal and of low-temperature coke dust finely pulverized, preheating the coal, and tamping, excellent qualities of low-temperature coke had been produced.

Discussing the economics of the coke problem, he said that when travelling in this country he had heard the argument that low-temperature coke must be sold at a price comparable with that of coal. That view, however, was not held in America. It was found there that the sale of coke depended, not upon its price, but upon its quality. If all the high-temperature cokes available were good enough, there was no trouble whatever in selling them. His Company sold every day about 12,000 tons of high-temperature coke made in their plants, and it was sold by reason of its quality. They could sell any coke, provided the ash content was sufficiently low, and, of course, provided that the ash was of the proper fusibility. It was the experience that if the coke was satisfactory and did not give any trouble, the average householder would pay any price within reason, even though that price might be 10s. or 15s. per ton higher than that of coal. In this connection he said that in Montreal his Company had a stock of 150,000 tons of high-temperature coke which they could not sell; this was offered to the public for 7 or 8 dollars per ton, but even at that price it could not be sold owing to the import of Russian anthracite which contained only 2 or 3 p.ct. of ash, and which was selling at 16 dollars per ton. The people preferred to pay 16 dollars for this fine anthracite rather than 7 or 8 dollars for high-temperature coke. He felt confident that if the efforts to produce really first-class low-temperature coke were continued, they would still be able to sell it, even if it cost 10s. more per ton.

Combustibility of Cokes.

Dr. G. W. Anderson asked if the combustibility of coke depended upon the volatile matter it contained, or upon its structure, because there were the two schools of thought, each of which was supported as much as the other. Some years ago he had been associated with an undertaking which had produced high-temperature coke from a blend of powdered coal and powdered high-temperature coke breeze. The results had been made public by Mr. E. V. Evans in his Cantor Lectures to the Royal Society of Arts. Although, as the result of the adoption of this practice, the rate of carbonization had increased, on the other hand, owing to the high percentage of breeze used—he believed it was of the order of 20 or 25 p.ct.—the absolute throughput per ton of coal had been reduced, so that there was no gain, from the carbonizer's point of view. The coke produced, however, was highly combustible, although it had contained no more combustible matter than high-temperature coke produced in the ordinary way. The scheme had been abandoned simply because the cost of production had become too high; and he expressed the view that the factor of throughput deterred many people from using blends. He could well imagine that, even as the result of using different types of coals, the throughput might be reduced. Then there was the fact that blending necessitated the use of a smaller size of coal than was used ordinarily in the plant, so that the bulk density was reduced, and probably the throughput as well He had in mind a probable reduction from the ordinary bulk density of 55 lbs. per c.ft. to about 45 lbs. per c.ft.; that reduction was vital. It had occurred to him that, although there was a loss of 2 p.ct. of volatile matter, which might be equivalent to 5 or 6 therms per ton, the effect of such loss might be counteracted if the proper structure could be produced in the coke. It had also occurred to him that it was the volatile matter in the ordinary low-temperature coke which rendered the average low-temperature process so uneconomical. If the low-temperature carbonization interests would put their coke through higher temperatures at a later stage, evolve their volatile matter and recover it in the same way as gas was recovered, it would help to improve their balance-sheets. With regard to the gas companies, he said that, if they took care to ensure that gas consumers used about 10 cwt. of coke for every 17 therms of gas they burned, the relationship between gas and coke would be balanced.

Better Sales Policies Needed.

Mr. E. G. Stewart recalled a visit he had paid to Stockholm some years ago, when he had been very much impressed by the development there in regard to coke. He had found that the

coke was selling very easily; indeed, he believed that the coke was sold very much more easily than gas, and he had been very much impressed by the fact that at the Stockholm Gas-Works quite as much attention was paid to the quality of the coke as to the manufacture of gas. Great care was taken to ensure that each successive delivery of coke to a consumer would behave in precisely the same way. A stage had been reached at which the coke contributed so much towards the cost of coal, which regulated the price of gas, that they did not want the people to use gas for central heating, because it would upset the balance of their works. The more thought he had devoted to the coke problem since then, the more firmly had he been driven to the conclusion that the Gas Industry as a whole must really devote more and more attention to it. The Industry should ensure that proper sales policies were brought into being. A change of mind was certainly becoming evident; coke was no longer regarded as a residual, but was coming to be recognized more as a main product. Nevertheless there still remained plenty of room for improvement. He did not believe that the majority of people in the Gas Industry would still regard with horror a coke with a high ash content, although they would so regard a coke which had a high moisture content.

There was still a large number who would say, if the ash content of the coke was high, that they would like to see it lowered, but who would point out that the ash was in the coal in the first place, so that it was difficult to see what they could do in the matter. These same people still sent consecutive deliveries of different types of coke to their consumers, so that any consumer might have three or four deliveries in the course of the year, each of which consisted of perfectly admirable coke, considered by itself, and assuming that the apparatus in which it was used was adjusted to suit it. But each one required a different adjustment; and consumers would not stand such treatment for any length of time. Coke could be burned easily if the consumer knew how to burn it, but he wanted to be sure that each delivery of coke would respond to the same treatment as its predecessor. There was plenty of room for coke. The average gas consumer consumed about 30,000 c.ft. of gas per annum. Assuming the coke available for sale to be about 8 cwt. per ton of coal carbonized, if the Gas Industry could sell to every gas consumer 25 cwt. of coke per annum, the whole of the Gas Industry's coke production would be sold quickly and easily, even if one did not take into account the growing demand for coke for industrial purposes. The really important point, however, was the necessity for creating a new attitude of mind on the part of the consumer, and the first essential in order to make any progress in that direction was to produce a coke which was better than the coal available for domestic use. One difficulty to be overcome was the fact that the ash content in coal was in the form of strata, and, therefore, it would lie better when the fire had burned down. The ash in coke, however, was divided finely throughout the body of the coke, and was usually in a finer state than that in the coal, so that when a coke fire was disturbed the ash, being very much lighter than coal ash, tended to float about the room. This was an important consideration from the point of view of the housewife. It was a difficulty which he imagined would be overcome chiefly by the use of special grates, such as were available at present, which need not be cleared out in the same way as were coal fires.

Mr. A. C. HORNE said that the need was to produce low-temperature coke at a price at which it would compete with household coal, if really big sales were to be achieved.

MACROSTRUCTURE OF COKE.

Mr. L. H. SENSICLE expressed the view that the macrostructure of coke had not received the attention it merited, and emphasized that by careful examination of the coke as it left the retorts, and by noting what portions of the retorts it came from, one could very often form conclusions as to the effect of various extraneous matters in the coal, size of grinding, and so forth. Discussing the problem of the travel of gases, he said he was inclined to agree with Mr. Hebden that the coking over of the top of the coke oven charge would not obstruct the passage of the gases if they tended to pass up the middle, at least in a modern oven, for the modern oven was designed with the intention that coking should proceed in a very straightforward way on a plane parallel to the walls of the oven. This was achieved partly by allowing the combustion flues to terminate at a predetermined height, slightly lower than the top of the charge. When coking Durham coals he had found that, with the high flue, the charge at the bottom of the oven became coked completely a long time before the top of the charge; shrinkage occurred, and subsequently there was a subsidence of the centre of the coal charge, and a cavity was left near the top of the charge. Into that cavity the plastic layer at the top expanded, and formed a voluminous mass of sponge. Such facts were exceptionally interesting as showing how variations in design could effect peculiarities in structure. Commenting upon the onion structure, he said he had observed what might be called striations running parallel with the coke oven walls. In that sort of periodic shrinkage, causing the banded structure, there must be something which determined the periodicity. It seemed to him that, when it occurred in an old type regenerator oven, in which reversal took place from one half wall to the other half, there was a periodicity in heating, and that that was determining the banded structure.

QUALITY OF RADIATION.

Mr. Sensicle expressed hearty agreement with practically everything that had been said concerning coke consumption in domestic grates. As has been said by Dr. Carpenter, one could either fit the coke to the grate or the grate to the coke. Thus, the carbonizing industries, whether low-temperature or high-temperature, had many methods of approach to the solution of the smoke problem. He believed there was very much to be said for the high-temperature coke solution of the problem, and the use of grates specially constructed to burn it. It had been said that a free-burning coke, produced at high temperatures from a blend containing fine coke breeze, fusain, crushed durain, or partially oxidized coal, would be preferable for such grates—a free-burning fuel, although of low volatile content, giving higher radiant efficiencies and having a higher reactivity. The quality of radiation had to be considered. It might be necessary to consider the use of coke and grates which would produce a fire giving a very bright glow, and in order that the wavelength of the radiation produced could be shortened to within such limits as would ensure " warmth comfort." This had been done largely with the gas fire.

Mr. E. C. LOWNDES inquired whether the low-temperature carbonization industry regarded oil or coke as the bye-product. He had more than once asked the question of the industry itself, but had failed to get any answer beyond a gentle chiding. Lump low-temperature coke as a domestic or industrial fuel went to a market which was already being nursed very carefully by the most efficient industry in the country—*i.e.*, the Gas Industry—and the economics of the problem seemed to be such that the only hope of a market of any substance for low-temperature coke was not one for lump coke, but only for a powdered coke.

THE AUTHOR'S REPLY.

Mr. ROBERTS, referring to the admirable briquettes which Mr. Nielsen had had prepared from anthracite duff mixed with pitch and re-carbonized, and from a semi-coke mixed with pitch and re-carbonized, said they were very good fuels, and he had used some of them in his own grate. The briquettes made from the anthracite material had burned quite successfully in an open fire; they had lasted very well, and were superior to other briquettes made with a smokeless binder which he had tested. Discussing the utilization of coke breeze, as a blending material, he said that at Ramsgate a blend of a non-coking and a coking coal had been used. A quantity of about 5 p.ct. of breeze had been produced, and in subsequent experiments that breeze was returned to the retort, to replace non-coking coal. If breeze had been available to the extent of 15 p.ct., however, it could be used, as Mr. T. Biddulph Smith had demonstrated, on a large scale. Dealing with Mr. Puening's remarks, he said he had not tested the effect of tamping a charge when coke breeze was used. He had noticed that on the Continent in at least two instances tamping had been dispensed with because of the improved coke they had been able to obtain by mixing semi-coke with a coking coal. That had been done in the K.S.G. retorts at Essen, and Dr. Bonneman had applied a similar process in Silesia; and in both those cases tamping had been dispensed with altogether. It was interesting to hear from Mr. Puening, however, that tamping had been found to be beneficial.

With regard to the price of fuel, he said it was not really necessary to charge less for a good low-temperature fuel than for the best house coal. A good low-temperature fuel was quite uniform and compact, and was a better fuel than any house coal marketed in London.

Replying to Dr. Anderson, he said that the combustibility of coke depended not merely upon its volatile content, but also upon its structure. The volatile content depended upon the temperature employed. He exhibited a coke the volatile content of which had been determined at 950°, 925°, and 900°; at 950° the volatile content was 23½ p.ct. and at 900° it was 20 p.ct. A proposal had been made some time ago that the volatile content should be determined at 925° +| 25°. That system would be fallacious, however, in a fuel the volatile content of which varied by 3½ p.ct. as determined at 950° and 900° respectively. In the new draft prepared by the Engineering Standards Committee there was stipulated a figure of 940° ± 10°, and that was more to the point. There was a difference as between the attitude of a gas company and a low-temperature carbonizing undertaking—and he was holding a brief for neither, if he were not holding a brief for both. Gas companies must dispose of therms in the gaseous form primarily. On the other hand, it was in the interests of the low-temperature carbonizing man to leave as much volatile matter as possible in the coke he produced, because coke was the main source of his revenue. If he reduced the volatile content of the coke to about 5 p.ct. he might have to go to a gas company cap in hand, and ask them to buy his gas, and he would be in the hands of the gas company in the matter of the price they paid him for it. Although it was necessary to produce oil, the present state of the oil market was such that one could not place a value of more than 3d. per gallon on any low-temperature oils, and one would be lucky to get 3d. He knew of large quantities of oil which were available for disposal at 3d. per gallon.

Discussing the blending of coal and coke breeze, and the statement by Dr. Anderson that in the experiments made by Mr. E. V. Evans the throughput of coal was reduced, he pointed out that Mr. T. Biddulph Smith had carbonized 1000 tons, in which he had used 15 p.ct. breeze, and had found, in coke ovens, that the net throughput of coal was increased.

With regard to the onion structure in coke, he did not think that the feature which Mr. Sensicle had observed depended on the ovens, but rather that it depended upon the type of coal used. There were some types of coal from each of which one could produce five or six different types of coke, depending upon the method of treatment adopted.

Midland Junior Gas Association

Meeting in Birmingham, March 5

PARTIAL DEHYDRATION OF TOWN GAS

By R. L. GREAVES, of Wolverhampton.

[Extract of a Thesis which gained the Author the Diploma of the Institution of Gas Engineers]

In the opinion of the author, the origination of gas drying by C. Cooper, M.Sc., and Messrs. W. C. Holmes & Co., Ltd., in the year 1926 marked an era in the manufacture and supply of town gas. The first comprehensive paper upon the actual working of a plant for the partial dehydration of town gas in England was published by C. Harris (Taunton) in 1927. Since then much additional information has been published.

The author presents this additional thesis, "The Partial Dehydration of Town Gas," because he has been in charge of a pioneer "Dri-Gas" plant at Shrewsbury, and observed the immediate effect of partially dehydrating the whole of one town's gas supply for the first time. The following is his review and summary of previous work, his own practical experience, research, and opinions upon gas drying.

A most serious cause for dissatisfaction and complaint is open to a consumer of town gas when he experiences trouble from partial or complete stoppage of gas supply such as is frequently caused by water, naphthalene, or rust and corrosion deposits in the mains and services. Equally objectionable in the case of lighting are the ravages upon mural and other decorations of sulphur dioxide as present in the products of combustion of gas containing sulphur compounds. Consequently, no gas undertaking will make the greatest possible progress unless it supplies gas which will not give trouble from any of these causes.

A process and plant for the cheap and ready removal of the sulphur compounds normally present in "purified" town gas, attractive to small and medium sized works, have not yet been devised. This is not the case as regards the removal of naphthalene and water. The process of washing the gas with gas oil for the removal of naphthalene has been in successful operation at Tynemouth, for example, since 1921.

Gas drying, however, did not come to the fore until 1926. Up to the present time 68 plants have been ordered, and of these over 40 are now working. It is significant that nearly all the works of the Gas Light and Coke Company are to be supplied with gas drying installations. Undoubtedly gas drying is now an effective and commercially sound process, in successful operation at many modern gas-works, and in addition the process of naphthalene washing is more efficient with dehydrated gas. Furthermore, dehydrated gas has a higher carrying power for naphthalene.

ADVANTAGES OF PARTIAL DEHYDRATION.

The principal advantages which may be looked for as a consequence of partial gas drying are:

(1) Prevention of annoyance to consumers, commonly due to water deposition.
(2) Prevention of annoyance commonly due to naphthalene, owing to the higher naphthalene carrying power of the dry gas.
(3) Prevention of freezing troubles on the district.
(4) Reduction in the number of complaints, and lower maintenance costs as a direct result of the three foregoing benefits.
(5) Prolonged life of mains, services, and meters, because internal corrosion does not proceed with an unsaturated gas.
(6) Reduction in the cost of pumping district syphons, owing to freedom from condensation of water.
(7) Drying-out of any water-logged or partially water-logged mains and services, with consequent improved distribution.
(8) Discovery of leaks in mains, and in water-logged ground and flood districts, since district dew-point tests readily indicate such conditions. This leads to (*a*) reduction of gas leakage, and (*b*) prevention of water inflow.
(9) Increased sale of gas is the natural result of unobstructed gas supply and improved service to the consumer.
(10) It is claimed that dry gas prolongs the life of a gasholder. (An oil film on the water surface is required inside a "wet" gasholder if the dry-gas plant is situate on the holder inlet.) Also the tar seal of a waterless gasholder is in a much better and safer condition with dry gas.

POSSIBLE DISADVANTAGES OF GAS DRYING.

1. *Effect on Meter Leathers.*—When the subject of gas drying became prominent in 1926, it was suspected that dried gas would cause dry stiff meter and governor leathers. On the other hand, water plays an important part in the processes at work harmful to meter leathers. For example, traces of SO_2 in saturated coal gas attack the iron, brass, and leather of meters, bleaching and rotting leathers where the dressing is faulty. The organic iron compound of meter leathers enters into chemical reaction with the corrosion products of saturated gas containing traces of hydrogen cyanide, carbon disulphide, and ammonia, acting upon the metal of the meter. Such conditions are indicated by the presence of blood-red aqueous liquors in the meter cases, and result finally in the perforation of leathers and tinned iron plate. Gas drying, in the author's experience, definitely arrests this action, and meters at Shrewsbury, which contained corrosive aqueous liquors in 1928, before the introduction of partially dried gas, dried out after the introduction of gas drying, and a light oil deposited from the gas was found in the meter cases instead. Iron and steel test pieces immersed in the oil for two months showed no loss in weight or sign of corrosion. The same oil is found in the district syphons in small quantities, where large quantities of oily aqueous condensate were prevalent before gas drying. Since gas drying, only a small quantity of light oil is deposited. Time will show, but every indication is that gas drying will result in an enhanced life of meters. The first year of gas drying resulted in a decrease in meter repairs of 21·5 p.ct.

2. *Dust.*—It was reasonable to suppose that light particles of rust would be carried forward by the gas when mains and services containing moist rust dried out. The experience of those undertakings which have supplied dry gas, however, is that they were never more free from complaints, and the stoppage of service pipes is practically unknown. Furthermore, old mains and services will frequently be renewed, existing rust deposits will gradually be eliminated, while new mains and services will remain dry and will not rust.

3. *Iron Carbonyl.*—Taplay's research (Transactions of the Institution of Gas Engineers, 1919-20) shows that dry carbon monoxide acting on metallic iron results in the formation of ferro-carbonyl. Oxide of iron, from the combustion of this compound, is often deposited on fireclay bricks, gas-fire fuel, steatite burners, and mantles, giving a characteristic red stain. It may be feared, therefore, that discoloration will increase with dry gas. At Shrewsbury no greater discoloration has occurred with dehydrated gas than before it was supplied.

4. *Reduction in Volume due to the Removal of Water Vapour, and its Effect upon Calorific Value and Gas Leakage Figures.*—The water vapour removed from town gas in the drying process results in an equivalent reduction of gas volume, and an increase in calorific value. Hence the effect upon the unaccounted-for gas and upon the quality and quantity of gas sold is important. Under the existing General Notification of the Gas Referees (Gas Regulation Act, 1920) a wet experimental meter is used in testing for calorific value, so that partially dehydrated gas becomes saturated in passing through the meter to the test burner; consequently the calorific value as tested is lower than that supplied to the consumer. This represents a loss in revenue. Suppliers of "dry" gas claim that they are entitled to this revenue, and they hope to secure a special prescription making due allowance. In practice the loss in revenue from this source is not as great as that which might be anticipated. The reason for this seeming discrepancy is that when saturated gas is supplied, the water deposited in the mains and services results in a reduction in volume of the gas and an increase in calorific value. The volume of water vapour removed by a gas drying process need hardly exceed the normal volume deposited in the ordinary course in the mains. Actually, therefore, the volume and calorific value of gas sold are only affected by the excess water vapour removed at the drying plant over that normally deposited on the district by saturated gas. Such excess need only be very small indeed for the full benefits to be secured from partial dehydration at the works. The unaccounted-for gas at Shrewsbury after gas drying showed an increase of 0·5 p.ct.

Choice of Method of Gas Drying.

After consideration of arguments for and against gas drying, such as the foregoing ones, a final decision as to desirability of installing such a plant depends upon the usual considerations when deciding upon plant for any purpose.

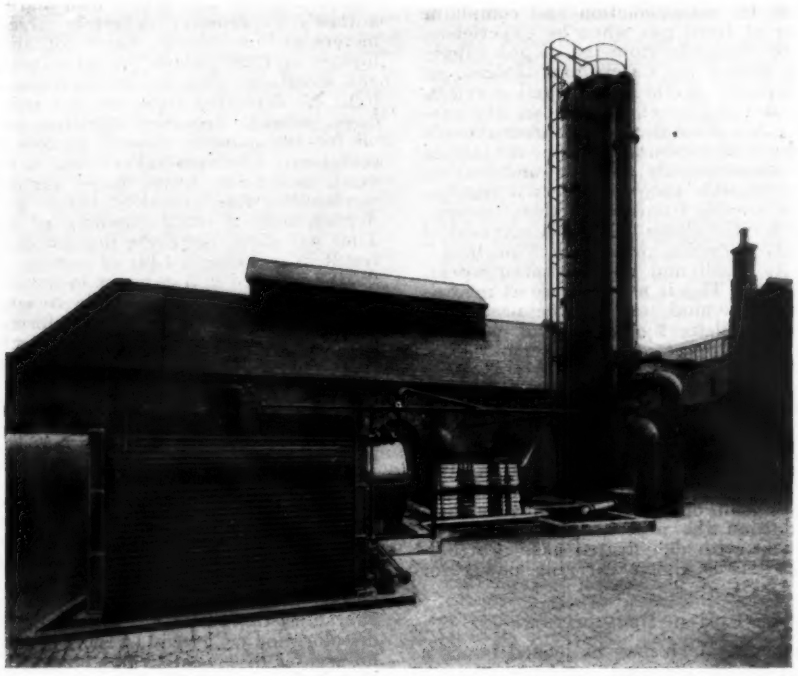
It is the author's opinion that such considerations present no adequate reason to abandon the idea of gas drying unless local conditions present some peculiar disadvantages; and that in general the savings indicated, which result from the supply of dehydrated gas, show a profit.

Certainly the undertakings working pioneer plants are performing an experiment invaluable to the gas industry.

The choice of method lies between (1) refrigeration, (2) compression, and (3) gas washing with a liquid absorbent.

At the present time the last-named is cheapest for ordinary low-pressure gas supply as regards capital and working costs. In addition, for this process the power required is low, while fewer practical difficulties require to be surmounted. For example, with refrigeration or compression, undesirable deposition of light oils is liable to occur.

Plant.—Each process may be performed in varying types of plant. Dismissing the two processes first mentioned, a choice has to be made for the gas washing process between (*a*) types of washers and scrubbers, and (*b*) suitable liquid absorbents.



A VIEW OF THE "DRI-GAS" PLANT AT SHREWSBURY.

The process patented by Messrs. W. C. Holmes is, in the author's experience, efficient and satisfactory in every respect in so far as the first year of working a pioneer plant and observing the effect upon the district during that period is a guide; but obviously years must pass before the utmost benefits are anywhere experienced, or the whole of the existing theories proved or disproved. With Messrs. Holmes' process the choice lies between a brush washer and a tower scrubber. In either case $CaCl_2$ is used.

The Liquid Absorbent.—A concentrated solution of calcium chloride is as yet more popular than glycerine for gas drying, while sulphuric acid is too dangerous in handling and too corrosive towards plant to compete with either of these. $CaCl_2$ has the advantage of being cheap, comparatively non-corrosive, and stable. Glycerine is more costly, very viscous at the necessary strength for efficient water removal—namely, 86 p.ct.—and a loss occurs during reconstruction.

Position of the Plant.

The choice of the best position to install a dry gas plant lies between the inlet side and outlet side of the gasholders, and gas entering the plant must be free from ammonia and sulphuretted hydrogen. The inlet position is attractive because the capacity of the plant will be governed by the maximum make and not by the maximum output. A disadvantage with "wet" gasholders is that an oil film has to be maintained upon the water in the holder tank when dry gas is stored. This may lead to discoloration of the paint, and a somewhat uncertain factor is introduced by the maintenance of this oil film. The protection of gasholders from internal corrosion is a natural consequence of storing dry gas. If conditions allow there is no doubt that the inlet is the better position for waterless gasholders, and with other gasholders the desirability or otherwise of the oil film will then be a decisive factor.

The inducement for choosing the outlet position is that the expense and uncertainty of maintaining an oil film within the holder is obviated, and the holder is not disfigured. The capacity of the plant is governed in this case by the maximum hourly output. Local conditions make this condition advisable. The pressure absorbed by the plant is only two or three tenths of an inch.

Holmes "Dri-Gas" Process at Shrewsbury.

The patent Holmes "Dri-Gas" plant installed at Shrewsbury has been at work since August, 1928. The gas is washed with a concentrated solution of calcium chloride in a tower scrubber situate on the outlet of the town gasholder. Owing to the layout of the works it was not practicable to install the plant on the inlet of the gasholders; hence a plant capable of dealing with the maximum hourly output was placed on the outlet of the town holder. This plant has readily performed the guarantee—namely, a reduction of the dew point of the gas 25° Fahr. below the inlet gas temperature. It consists of a tower scrubber with 20-in. gas connections to deal with an output of over 100,000 c.ft. per hour during periods of maximum demand. The nominal daily output of the plant is 1,300,000 c.ft. At these maximum rates the back-pressure of the apparatus is only 0·10 to 0·15 in. The tower is packed with earthenware "propeller tower filling." Calcium chloride solution is pumped from the storage tank via coolers to the top of the tower by a Lee Howl pump, all iron fitted, of 1000 gallons per hour capacity. The chloride passes through sprays (which consist of jets impinging upon flat circular iron plates) and flows by gravity down the grooves of the earthenware propeller tiles to the base of the tower, whence it overflows through a seal pot back to the storage tank. The gas connections to the tower are inlet at the base, outlet at the top, and by-pass, complete with Westwood chain-operated gas valves with drain on inlet and outlet connections, 1 in. in diameter. At a position about 28 ft. from the top of the tower a tray catches a proportion of the solution flowing down the tower (approx. 5 p.ct.) and by-passes it through a 1-in. diameter pipe to the cast-iron rack evaporator.

The Evaporator consists of a tier of cast-iron tubes, through which the exhaust steam from the pumps passes, and, above the tubes, a trough into which the proportion of solution caught by the tray flows. The trough is provided with jets and a by-pass, so that any number of the jets can be put in operation to discharge a stream of weakened $CaCl_2$ solution over the external surface of the

hot tubes. A collecting trough catches the solution at the base of the evaporator, whence the warm concentrated liquid flows by gravity to the storage tank via a conical filter, where it mixes with the return solution from the tower and finally with the bulk of the stock. The rate of evaporation is controlled by the number of jets in action, and is regulated to maintain the required density in the storage tank. The temperature of the stock solution is increased by the evaporating process and also by the latent heat given up in the tower during the absorption of water vapour. This increase in temperature is undesirable because, the lower the temperature of the solution, the higher is the efficiency of water removal in the tower. Therefore cooling is resorted to. The degree of cooling desirable is determined by the temperature of solidification of the solution, and is controlled by the temperature and volume of the cooling medium.

The Cooler consists of three batteries of tubes, each battery containing two vertical tiers of wrought-iron tubes, expanded into the inlet and outlet chambers through which the solution is pumped upwards to the tower. Gasholder tank water is the cooling medium, and it is pumped to delivery spray branches and perforated pipes situated above each battery of cooling pipes. The water flows downwards over the tubes and collects in a concrete basin, whence it flows back by gravity to the gasholder tank.

Method of Working.—In starting up the plant, calcium chloride is dissolved in warm water at the evaporator. A density of about 76° Tw. is aimed at, and about 3 tons of chloride is dissolved per million c.ft. per day plant capacity. (1½ tons is sufficient if the plant is on the holder *inlet*.) The stronger and colder the solution of calcium chloride, the more efficient it is for dehydration. The solution is normally kept between 74°-80° Tw. according to the time of year. Crystallization must be avoided, and the limit to the strength of the solution is governed by the temperature of the solution at the inlet to the tower sprays. The relation between this temperature and solidification may be determined by reference to vapour pressures of $CaCl_2$ solutions. In practice, when deciding upon the safe working strength for the forthcoming 24 hours, a reasonable margin is allowed for the effect of a sudden drop in air temperature at night, particularly in cold weather.

The rate of circulation of the calcium chloride solution through the plant, controlled by the speed of the pump, is maintained to deal with the maximum hourly output per day, and 600 gallons per hour is found to be a suitable rate per 100,000 c.ft. of gas passed per hour.

The evaporator is set to maintain the required evaporation rate. The latent heat of the water vapour absorbed is given up to the solution and the gas. The temperature of the solution is also raised during evaporation. This heat is removed at the coolers by pumping cold gasholder water at a suitable rate.

Supervision.

The supervision of the plant is as follows:

(1) Observe temperatures: (*a*) Inlet and outlet gas temperatures; (*b*) the temperature of the calcium chloride at the inlet and outlet of the coolers and at the storage tank; (*c*) the temperature of the cooling water; (*d*) a recording thermometer registers the air temperature.
(2) Determine the density of the stock calcium chloride solution twice daily, and if necessary increase or decrease the number of jets discharging at the evaporator, so as to maintain the required concentration.
(3) Test the dew-point of the outlet gas.
(4) Time the stroke of the pumps.
(5) Calculate the theoretical dew-point for the conditions maintained, and compare it with the dew-point test.

The foregoing readings are taken daily. In addition, the cooler tube and cover joints are examined periodically for soundness. The loss of one gallon of calcium chloride solution at 70° Tw. represents a loss of 5 lbs. of calcium chloride.

It is difficult to avoid loss of chloride at the glands of the pump, but rubber packing makes a sound and lasting joint when pumping concentrated calcium chloride solution. Wind screens are necessary at the evaporator, to avoid loss, and all jets and delivery pipes are arranged to prevent loss by splashing. By attention to these various sources of loss the stock of solution is maintained constant. The pressure thrown by the plant is indicated by means of an inclined Hay's differential gauge with graduations reading to 1/100 in. Normally this differential pressure is less than 1/5 in. water gauge, varying with the volume of gas passing. The inlet gas to the tower is tested for ammonia. This gas must be absent for it reacts with calcium chloride to form sludge.

District dew-points are taken periodically at outlying points and compared with the dew-points at the works. When a new plant is started, drying-out on the district is rapid except in badly waterlogged or leaky mains. The latter are readily detected by district dew-point tests, and thus the discovery of water inflow and leak is facilitated. Sound waterlogged mains dry out in due course.

Dew-Point Tests.—The standard gravimetric test for moisture in the gas is an absolute method of determining the dew-point. Regnault's hygrometer is not recommended, as the dew-point may be masked by condensation of hydrocarbons. A special form of enclosed and modified flow-type hygrometer has proved to be reasonably accurate and rapid in regular use. It is an adaptation of the wet and dry bulb thermometer, and is calibrated against a gravimetric test whereby a factor for the instrument is determined. Thereafter, dew-points may be found by taking readings of the thermometers and applying Glaisher's factor and the factor for the instrument.

The air temperature is regarded as a practical guide in controlling dew-points, providing a margin is allowed sufficient to ensure that the dew-point is lower than any likely district ground or air temperature.

Freezing troubles were not experienced during the severe frost in February, 1929, when these were rampant in many districts in other towns supplying saturated gas. District syphon pumping is now negligible. Unsteady lights due to condensation in services are non-existent.

Summarizing, the author is convinced that the plant described is simple, and readily controlled; that the partial dehydration of town gas at Shrewsbury is efficient, economical, and effective; that anticipated advantages and savings have been realized as far as the working to date can allow; and, that the possible disadvantages have proved to be largely theoretical and practically of no consequence.

The capital cost of the complete plant at Shrewsbury was £1786. The gas sold in the year of its installation, 1928, was 284 million c.ft.

The labour cost of operation	= 4½d. per million c.ft. of gas treated
The steam required for pumps	= 2044 lbs. per million c.ft. of gas treated
Power (tower scrubber) . .	= *Nil*
Lubricating oil used . . .	= 1 pint per million c.ft. of gas treated

Taking into account the saving in cost of syphon pumping of 4s. 6d. per million c.ft. the cost figure for gas drying is 0·15d. per 1000 c.ft.

Incidentally, if a process for the removal of sulphur compounds in town gas could be worked at a similar figure, the chief disadvantage of domestic gas lighting would be economically overcome. Till that time, gas drying will rank as the most far-reaching development of modern gas engineering and supply.

Discussion.

The President (Mr. W. Macnaughton, of Wolverhampton) said that gas drying plants appeared to be of very great importance and value to works, whether large or small.

Mr. W. L. S. Spinks (Senior Vice-President), in proposing a vote of thanks to Mr. Greaves, mentioned that it was a matter for great satisfaction that two winners of the Diploma were members of the Midland Junior Gas Association. The system of gas dehydration was comparatively new, and only time would show whether the advantages claimed would be continued. The cost involved was rather considerable, and naturally many engineers held back until definite cumulative experience was available. It seemed to him that on many works troubles arising from moisture in mains and services were due, to some extent, to inefficient cooling. Time would determine, of course, the question of the dust nuisance, but it did not appear that those who had adopted the method were greatly troubled in this respect.

The resolution was seconded by Mr. F. A. C. Pykett (Coventry), who said it was obvious that dehydration meant a reduction in condensation on the district. This result was very noticeable; and another result was a much longer life for the meters. He had seen excessive rust in wet meter drums.

The resolution was carried, and Mr. Greaves, in reply, said in the early period there was a certain amount of rust, principally at the inlet to the high-pressure governors. The installation of a trap was effective in dealing with this, and the trouble proved to be only temporary. Dust troubles were merely early troubles, and were in no way serious. Condensation was enormously reduced. There was also a great saving in pumping costs, and the life of the meters was much increased. One engineer claimed that the various economies effected gave an actual profit on the working of the system.

Mr. A. W. Elliott (Shrewsbury), who said he had had experience of the dehydration plant at Shrewsbury, pointed out that the benefits of gas drying appeared to be immediate. Naphthalene troubles had entirely disappeared, and water troubles to a very large extent. Dry rust, an original difficulty, had not recurred. On the district he had found some evidence of oil deposition; it appeared to be an emulsion containing light oil.

Mr. J. H. Wainwright (Halesowen) stated that complaints were materially less since the system was adopted at Halesowen.

Mr. A. R. Myhill (Birmingham) remarked that the adoption of gas dehydration enhanced the goodwill of the consumer, which consideration was most important.

Joint Meeting of Manchester District and Yorkshire Juniors

PAPER ON COKE OVEN GAS SUPPLY

Visit to the Thorncliffe Works of Messrs. Newton, Chambers, & Co., Ltd.

On March 18 the Yorkshire Junior Gas Association and the Manchester and District Junior Gas Association visited the Thorncliffe Ironworks of Messrs. Newton, Chambers, & Co., Ltd.

The visitors of the two Associations were received at the Ironworks by Prof. Hay and Major Miles, who, together with departmental managers and technical assistants, conducted the visitors over the extensive ironworks.

The firm of Newton, Chambers, & Co., Ltd., was founded in 1793, and was among the original makers of gas-works plant, steam engine parts, and domestic ironwork. In those days their blast furnaces were built of stone, and occupied the same position as their present modern and up-to-date plant; and it is interesting to compare the present very large production of pig iron with the old records showing an output of 20 tons a week 150 years ago.

The firm is extremely fortunate in its location. It mines its own coal from half-a-dozen local collieries; carbonizes its own coke in the most modern battery of coke ovens; provides its own pig iron in one of the latest furnace plants in the country; and manufactures its own castings and structural steelwork for its products. In 1793 under 30 men were employed, and to-day the number is 6000.

Regarding the firm's activities in the Gas Industry, it is interesting to note that James Malam, Murdoch's chief assistant, was employed at the works in 1805, and W. E. Newton, in 1852, took out the first patent in the world for bye-product recovery coke ovens. As in the early days they were the first to manufacture the latest apparatus, to-day they manufacture the most modern plant.

The gas-works plant manufactured by Messrs. Newton, Chambers, & Co. includes coal handling and storage plant, condensers, scrubbers, purifiers, and gasholders, besides general requirements such as pipes, valves, lamp columns, tanks, and bunkers. It may safely be said that the firm is the largest manufacturer of cast-iron plates in the world for tanks, purifiers, &c. Special machinery has been laid down for this class of work, and the control of the supply of raw material has greatly facilitated production.

Besides cast-iron tanks of varying magnitude, Messrs. Newton, Chambers, & Co. have built a very large number of fuel oil tanks for the Admiralty. Each of these holds 3-million gallons of fuel oil. Another standard form of water tank is that for the Colonial Railways. Other special tanks include the various vessels used in brewing and distilling.

The firm have American and Continental connections in their business of constructors of blast-furnace plants. Some of the most efficient and labour-saving blast furnaces have been erected by them in South Wales. They specialize in scientifically correct ore handling and distribution and furnace lines, together with the latest devices for gas cleaning and utilization. It is no uncommon thing for the raw materials for a furnace making 4000 tons a week to employ only one man per shift charging the whole of the raw materials.

Bye-product and chemical works plant are also manufactured and erected, and the experience in connection with their own bye-product plant and chemical works, where the disinfectant products known as " Izal " are made, enables them to be acquainted in a very practical manner with these plants.

After the inspection of the works, the party left for Newton Hall, Chapeltown, where luncheon was served to some 120 members.

Mr. J. W. Horwill, President of the Yorkshire Junior Gas Association, moved a vote of thanks to the firm and Mr. C. H. Bamber, B.Sc. (President of the Manchester and District Junior Gas Association), seconded.

Prof. Hay, in reply, alluded to the spirit of co-operation between the Gas Industry and the coal industry.

COKE OVEN GAS SUPPLY.

By Ralph Halkett, Junr.

I propose to deal in a wide manner with the supply of gas which we take from the coke ovens of Thorncliffe Coal Distillation, Ltd., at Smithywood. The chief object of coke ovens was to ensure a sufficient supply of coke suitable for blast furnace purposes, and also it was found to be a convenient and economical way of utilizing slack coal, which had a very low market value. In order to produce the coke a large quantity of gas had necessarily to be made; and apart from that which was utilized for heating the ovens, usually 50 p.ct. or more was looked upon as a waste product and simply burnt in the air, at the top of a long stand pipe known as the bleeder. Of recent years some of this gas has been used for boiler firing, for which purpose it is valued at something round about 2d. per 1000 c.ft.

After some considerable time the coke oven authorities realized that there was a market for this hitherto waste product by selling it to statutory gas undertakings in close proximity to the coke ovens. As a result of this, several gas undertakings made contracts with coke ovens for gas in quantities large or small, although no gas undertaking is absorbing so large a quantity per day as the Sheffield Gas Company—namely, 14 million c.ft. from four different sources. Referring again to the coke ovens, almost the reverse circumstances prevail at the present. Where gas was the waste product, coke now takes its place, no doubt due to the depression in trade generally. Consequently there are coke ovens erected solely for the supply of gas and its accompanying profits, rather than for the production and sale of coke. However, it is obvious that gas made at the pithead and from the poorest of coals can be sold to the gas undertakings at a price below that at which they can manufacture themselves, having bought coal and paid carriage. There are also the other bye-products from coke oven gas, such as sulphate of ammonia, benzole, &c. Some refine the benzole, for which they obtain a higher price than others who sell it crude.

Preparatory to Making Contracts.

Before making a contract for a supply of coke oven gas, it is necessary to remember that the gas undertaking is

responsible to the consumer and works under statutory obligations. First of all continuity of supply is essential. Therefore it is necessary to make adequate provision for unavoidable stoppages, whether of long or short duration, such as mechanical breakdowns as compared with a strike. In the case of the former we have installed at our Neepsend Works a new Humphreys & Glasgow automatic water gas plant of 3 million c.ft. capacity per diem in addition to our existing carburetted water gas plant, thus placing us in a safe position should any of our coke oven gas supplies fail. With regard to the latter it is impossible to say how long a strike will last, but as some measure of safety it is agreed that the coke ovens shall stock and maintain sufficient coal to give eight weeks' supply of gas; and consideration is given for this when fixing the price for the gas.

In addition to the stock of coal carried by the coke ovens the Gas Company also maintains a substantial stock; and, given sufficient notice, our carbonizing plant, which is always kept in ready working order, may be put under slow fire, ready to take up when the coal supplies at the coke ovens are exhausted, and if the trade dispute is not already settled.

Safeguarding for Quality and Purity.

These are two points of vital importance; and it tends towards harmonious working if the quality of the gas and quantity of impurities to be present in that gas are fixed and inserted in black and white in the agreement with the coke ovens. If the Gas Company is purifying the gas, as in our own case, it is essential that there should be no sudden and excessive variations in the impurities, which, if permitted, would cause disorganization in the purification plant and give unnecessary anxiety to those in control. The same rule applies equally if the purification is carried out by the coke oven authorities, for it is the gas undertaking which is responsible to the consumer for constant quality, pressure, and purity. In our agreement the quality of the gas must not be less than 520 B.Th.U., and the oxygen is limited to 0·5 p.ct., nitrogen to 9 p.ct., H_2S to 800 grains per 100 c.ft. With these regulations we find no difficulty in supplying gas of 500 B.Th.U. value and of the prescribed constituency to our consumers in Sheffield.

Linking Up the Coke Ovens with the Gas-Works.

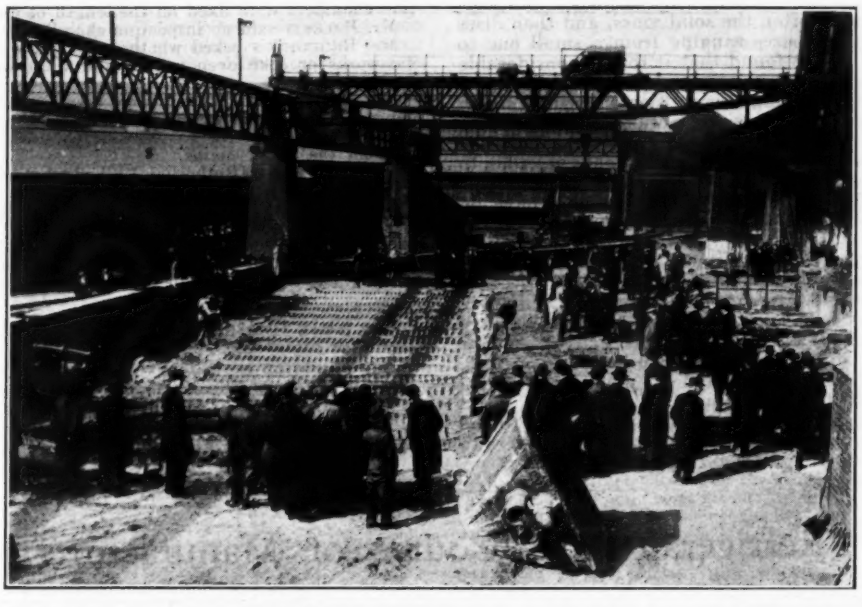
In the case of Thorncliffe, this was done by laying a 16-in. steel main from the Gas-Works at Neepsend. Before this was done, the Ordnance map was consulted, and various routes were drawn up for approval. Although all had their good points, it was finally decided to take the nearest route having the least length of main road with which to contend. This was done for two reasons—first to facilitate the execution of the work, and secondly, by no means the least important, to avoid roads over which heavy traffic was continually passing. The distance from the coke ovens to the gas-works is 6¼ miles. The first mile of main from the gas-works was laid through a large stretch of waste land, part of which is used by the Gas Company and part by the Corporation Electric Power Station for tipping purposes. As would be imagined, this consists mostly of clinker and ashes, and generally speaking is not suitable for preserving pipes whether of cast iron or steel. However, very careful attention was paid to this section, and clay and soil displaced on numerous other main jobs on the district were carted to the site, and we were very careful to see that the pipes were surrounded with suitable material. In addition to this, double wrapping of the pipes was resorted to in bad places, and in every case they were very well tarred.

Sections of about 200-300 yards were tested frequently to 30 lbs. per sq. in. air pressure, and every joint was carefully inspected and tested for leakage by painting with soapy water. In this way there was never any very great length of trench open. Several gangs of between 30 and 40 men worked at regular intervals until they met and joined up. The whole length was completed in five months. The cost of laying 16-in. steel pipes under these conditions, including all accompanying charges, was approximately £5200 per mile. Of course, this figure would be increased if main roads were encountered a great deal. When all was completed, the main was connected at the Neepsend Gas-Works end, and gas was compressed and the pipe vented at the coke ovens. It was deemed advisable to vent the gas at Smithywood as the gas-works is surrounded by property in very close proximity. Tests of the gas were taken frequently; and when it was found that all the air in the main had been displaced, the final connection was made, and the meter commenced registering the quantity passing.

Syphons were fixed only where absolutely necessary, and, as would be expected, most of the condensation is deposited in the first section of the main and collected from the first few syphon pots. On a main taking crude gas and at a fairly high pressure, condensation is a matter which needs careful attention. The pressure at the syphons near the coke ovens is sufficient to blow the liquor into the tank, and no pumping is necessary. Although the amount of liquor collected in each syphon is fairly constant, we have found that it is practically necessary to pump the syphons daily, except at week-ends, when Sunday is omitted. On Monday morning there is double the quantity to be extracted from the syphons. For this purpose it is necessary for us to maintain a motor tank wagon solely for the coke oven mains. There are four mains altogether, some 17¾ miles in aggregate.

Until recently we have had a 250-gallon tank wagon, but we have just now built one on a new Commer 3-ton chassis to take 500 gallons.

It takes some few days to obtain settled conditions, as all the valves, both at the coke ovens and the gas-works require careful and accurate setting for the quantity of gas to be taken.



DURING THE INSPECTION OF THE THORNCLIFFE IRON WORKS OF MESSRS. NEWTON, CHAMBERS, & CO., LTD.

Naphthalene.

This ingredient in gas is one that could easily be done without, and is only a constant expense to the gas companies in providing plant with which to eliminate it and so prevent it passing on to the district except in very small quantities. In our agreement with the coke ovens it is stipulated that the quantity of naphthalene present in the gas when it leaves their works shall not exceed 2 grains per 100 c.ft. Tests are taken daily by ourselves at both the coke ovens and our own works, and in these circumstances

I am pleased to say we do not have much trouble. The gas is, however, washed at our works with gas oil in a Holmes rotary scrubber, where the quantity present is reduced to a trace.

The oil used in the washers is tested before use, and is found to contain no naphthalene; and therefore we expect to get the maximum efficiency from that oil. When we first commenced washing for naphthalene with this method we put roughly 1000 gallons of oil in the washer, and changed it when it became saturated with naphthalene. However, by experience we have found that greater economy and equally as good results are obtained by running off so much spent oil daily from each washer and replenishing with the same quantity of new oil. The quantity of oil used each day varies according to the naphthalene in the gas, and in our case varies from 11 gallons to 22 gallons per million c.ft. The oil, when spent, contains about 2 p.ct. of naphthalene. I understand that Thorncliffe Coal Distillation, Ltd., are placing an order for a naphthalene extraction plant to wash the gas at their end, so that there should be practically no deposit in the main from the ovens to our works.

To illustrate how completely blocked a crude gas main can become with naphthalene I have beside me photographs of sections cut from our 12-in. main bringing gas from one of the other coke ovens. This occurred after the main had been in use for six years, and, as it is in continual use, it was a difficult matter to find a suitable opportunity to shut off and clear out. However, it was a matter of urgency, and the first Bank Holidays were utilized for the purpose. Steam was utilized to soften the solid mass, and then discs were drawn through in sizes ranging from a small one to full size of main. It was found that it took a considerable time for the steam to work its way through the solid mass. For the purpose of supplying steam, 3 or 4 Sentinel steam wagons were parked at the various sections where the pipe had been cut out, and men worked in shifts keeping the boilers fired so that they were going all night, in order to prepare for drawing the discs through next morning.

The corrosive effect which coke oven gas may have on the metal parts and diaphragms of meters, and also on the mains and services, is much talked of. Presumably it is thought that the gas, being stripped of its lighter oils in the benzole washing, will automatically lose its lubricating powers and thus promote fresh troubles in the distributory system. As far as Sheffield is concerned, no troubles have arisen which might be attributed to that source. Of our 136,000 consumers, approximately 91,000 have wet meters, but there are nearly 43,448 prepayment meters of the dry type in use and 3000 to 4000 ordinary.

If coke oven gas is to be utilized, it must be sold to the gas undertakings who have already the statutory powers to distribute it. It must also be sold to them at a price which pays both the coke oven owners and the gas undertakings, and at the same time permits of its being retailed at a price to the consumer which will pay him to displace other methods of heating. In Sheffield 46 p.ct. of our total annual sales of gas are used industrially, and, like other towns, we have keen competitors in oil, producer gas, solid fuel, and electricity. At the present time the price of our gas ranges from 2s. 9d. per 1000 c.ft. for small and domestic consumers, through a carefullv graded scale down to 1s. per 1000 c.ft. In addition to this there is a special rate for gas engine users, and contracts are made with large consumers (on their signing an agreement form) taking 25 millions per annum, provided they guarantee an increase of 15 p.ct. on that figure; and in the case of those taking 100 million per annum and over a guarantee of 10 p.ct. is required, and then all gas is charged for at 1s. rate. This has proved of great value to the large works in Sheffield, and has only been in operation for one complete year. If there should be a revival of trade our consumption would go up enormously, as we know a large number of firms have already converted their furnaces for use with town gas, but owing to lack of trade have been unable to put them into use.

Mr. Halkett then described the plant at Smithywood, a full account of which was given in the "JOURNAL" for May 28, 1930, p. 517.

Discussion.

Mr. G. W. BROUGHTON (Haslingden) asked how many inspection chambers were fixed on the length of main.

Mr. HALKETT said no inspection chambers were fixed as yet.

Mr. BROUGHTON asked whether the gas was measured at the gas-works or coke oven works, and what was the size of the syphon pots.

Mr. HALKETT said that in some cases it was measured at the gas-works, in others at the coke ovens. He thought it best to measure the gas at the gas-works. They used 20-gallon syphon pots on the 16-in. mains.

Mr. T. R. COOK (Rotherham) asked what was the price of gas into holders at Sheffield.

Mr. HALKETT replied that it was 10d. per 1000 c.ft.

Mr. F. FIRTH (Leeds) said he understood that coke oven gas delivered over a distance of ten miles cost about the same price as coal delivered from the colliery and then made into gas.

Mr. HALKETT said that in their case it paid to buy coke oven gas.

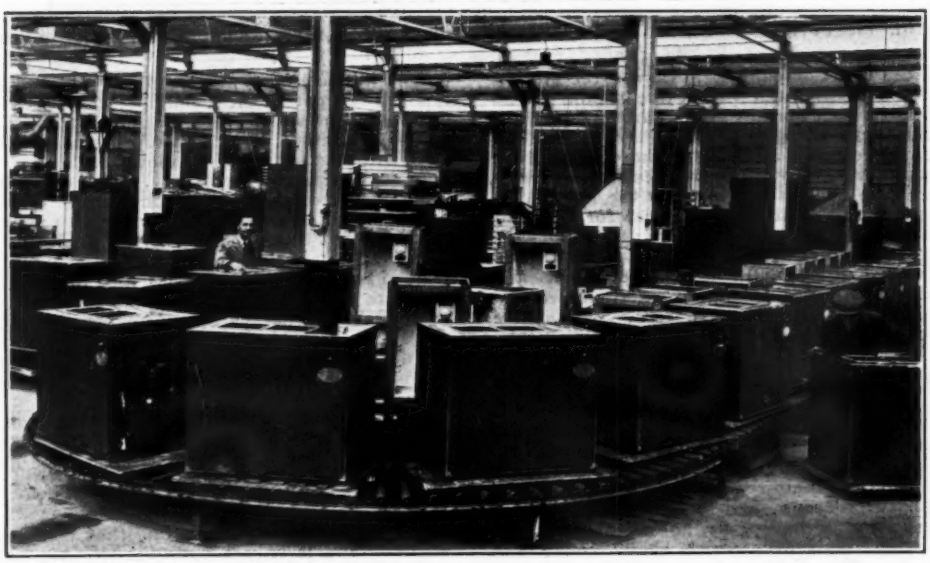
The party then adjourned to the Royal Victoria Station Hotel for high tea.

Mr. HORWILL moved a vote of thanks to the Chairman and Directors of the Sheffield Gas Company and to Mr. Ralph Halkett, Sen., for their kind hospitality.

Mr. J. ALSOP (Manchester Secretary) seconded.

Mr. HALKETT, Sen., replied.

Refrigerators in Course of Manufacture



Messrs. J. Lyons & Co., Ltd., have ordered 700 "Electrolux" refrigerators for conserving ice cream (making 1200 in all) for distribution to their agents throughout the country. Our picture shows the refrigerators in the course of manufacture at Electrolux Works, Luton. The produce of Lyons' ice cream factory is now distributed throughout the whole of England. More than 2 million portions of Lyons' ice cream have been sold in a single day, and every year the consumption grows greater.

REGISTER OF PATENTS

Gas Switches.—No. 340,800.

GUNNING, J., of Bournemouth.

No. 1353; Jan. 14, 1930.

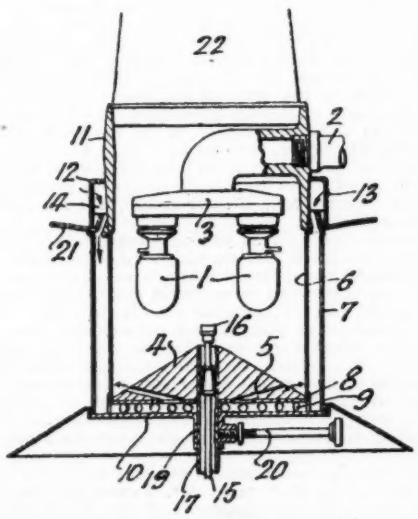
The object of this invention is to provide a gas tap which can be operated at a point some distance from the tap. The invention relates to apparatus of the character in which a longitudinally movable valve member controlling the supply of gas to a burner can be moved from a distant point to establish or cut off the supply of gas to the burner, the means used for actuating the valve being a device of the character of a Bowden wire consisting of an inextensible wire connected at one end with the valve member and at the other end with a switch, and enclosed within a fixed non-flexible guiding tube.

Incandescent Gas Lamps.—No. 341,655.

SOUTH METROPOLITAN GAS COMPANY and CHANDLER, D., both of Old Kent Road, S.E. 15.

No. 37,535; Dec. 6, 1929.

The main object of this invention is to provide improved means for preheating the secondary air. A preheater for the secondary air is provided comprising a body which is located below the gas mantles and has a conical, convex, or double concave surface for reflecting heat radiated from the gas mantle or mantles to effect preheating, and which, in some cases, is provided with ports or passages through which the secondary air is admitted to the lamp so as to assist in the preheating. Preferably the surface of the preheater is polished so as to reflect the light.



New Gas Lamp.

The lamp is provided with two concentric globes, the secondary air flowing through the concentric space between them to the preheater, and thence through the ports or passages to the lamp. Alternatively, the secondary air may be led to the preheater through an annular space formed between two cones at the botton of the lamp, the upper of these cones forming a reflector. There is provided a superheater which is shaped to form a comparatively deep annular chamber.

The accompanying drawing is a sectional view of part of a lamp. 1 are mantles which are supplied through a pipe 2 with a mixture of gas and air which is preheated by a superheater 3 of known form. 4 is a preheater formed of metal, the upper surface of which is conical and is polished so as to reflect heat radiated from the mantles 1. The preheater may be formed of glass, pottery, or other suitable material.

The preheater is formed with passages 5 to which secondary air is fed from the space formed between concentric globes 6, 7, the air passing to the passages 5 through apertures 9 formed in a ring 8 on which the preheater rests, and which is supported on a base 10. The secondary air is heated as it passes through the passages 5 and is directed by the passages towards the inner globe 6 and is further heated by the reflected heat.

The pipe leading to the superheater is provided with a ring 11 having near the bottom thereof an annular casing 12 provided with ports or apertures 13 to admit secondary air to the space between the globes 6, 7. The ring 11 is provided with radiating fins 14 which still further assist in heating the secondary air. 15 is a pipe through which gas can be admitted to a pilot burner 16. The pipe 15 is located in a tube 17 supported by the bottom of the lamp.

In order to position the base 10, it is provided with a flange 19 having a boss which is bored to receive a screw 20 by which the boss can be clamped in position on the tube 17. 21 is a portion of a main reflector. 22 is a chimney which is made of greater length than is the case with a lamp not having a preheater, the object being to induce an increased flow of air.

Tar Binders for Road Stone.—No. 341,901.

SOUTH METROPOLITAN GAS COMPANY and PICKARD, H., both of Old Kent Road, S.E. 15.

No. 22,590; July 23, 1929.

According to this invention a bituminous material is given the melting-point and mechanical strength required in a binder for materials used in road construction by dispersing coal in tar at a temperature of 250°-300° C., and by mixing the tar-coal preparation with pitch and finely subdivided mineral matter.

The proportion of coal dispersed in the tar should be between 10 and 18 p.ct. of the weight of the tar, and the proportion of pitch added should be up to two-thirds of the weight of the dispersion of coal in tar. The mixture thus made should be mixed with 40-60 p.ct. of its weight of finely subdivided mineral matter, previously dried and warmed.

Gas-Fired Baking Ovens.—No. 341,860.

BAKER PERKINS, LTD., of Willesden, N.W. 10 (Assignees of ENGELS, E. O., of Saginaw, U.S.A.

No. 80,903; Oct. 11, 1929. Convention date, Oct. 13, 1928.

This invention relates to gas-fired ovens of the indirect-heated type wherein gas burners are enclosed in jackets (within the oven) that confine the gaseous products of combustion, and an exhaust pipe conducts them to a point outside the oven and usually outside the building in which the oven is located. An object is to do away with the necessity of employing natural draught in the exhaust pipe, and, instead employing a forced draught which permits the use of relatively small exhaust pipes. An additional advantage of the improved exhaust pipe draught arrangement, state the patentees, is that an exhaust pipe of considerable length can be employed without impairing its efficiency. According to the invention, the exhaust gases are removed or neutralized by injecting into the exhaust pipe a non-explosive diluent gas directed towards the delivery end of the pipe. The invention also comprises means for supplying compressed air, a combustion jacket enclosing the burner, an exhaust pipe connected to the jacket, and a conduit connecting the compressed air supply with the exhaust pipe whereby air is automatically supplied to the exhaust pipe whenever air is supplied to the burner.

Securing Means for Meter Leathers. No. 342,473.

THORP, F., and PARKINSON & COWAN (GAS METERS), LTD., both of Kennington Road, S.E. 11.

No. 39,241; Dec. 23, 1929.

An object of this invention is to provide convenient means for mounting and securing the diaphragm leather of a meter in such a manner that the perishing of the leather adjacent to the securing position is prevented and life of the diaphragm prolonged.

The deep rim of the meter is provided with a curved beaded lip affording an annular cavity filled with grease, around and within which the margin of the diaphragm leather is lapped, and held by a fastening band on one side and by non-ferrous loose wire located within the cavity.

For securing the diaphragm leather in a manner adapted to avoid pinching or clamping the leather and thus causing expulsion of the preserving oil of the leather, the deep rim is given a curved form (preferably outwardly convex) to provide an annular cavity below, and terminates in a reinforcing bead which also affords a rounded support for the leather.

The margin of the leather is bent into the cavity and is held in place by a loose spring wire, the ends of which may be joined by a sleeve or other means. From the cavity the leather is passed around the beaded edge of the rim, over the curved part, and held by a fastening band upon the upper surface of the rim behind the curved part. The space between the leather and rim from the loose spring wire to the fastening band is filled with suitable leather dressing.

To avoid corrosive effect, the securing wire is formed of non-ferrous metal and acts to key the leather in the annular cavity without any clamping or squeezing effect upon the leather.

Radiation Limited

Ordinary General Meeting

At the Annual Meeting of the Company, held at the Cannon Street Hotel, London, on March 23, 1931, the CHAIRMAN, Mr. H. James Yates, in moving the adoption of the Report and Accounts, said:

I think few of us regretted the passing of 1930. It was a very trying year for the whole country, and it adversely affected many business concerns. But I am happy to tell you that—due to the vision and foresight of our policy during past years, and to our unceasing strenuous efforts—notwithstanding the many trading difficulties experienced in 1930, the solid progress of your Company continues. Our policy all along has been not to "put all our eggs in one basket." We are to a great extent self-contained as regards possessing businesses for the supply of our component parts, and these businesses in themselves have contributed in no small measure to our success.

In regard to the Directors' Report and Accounts, you will notice that this year we have given the comparative figures of the previous year. The audited accounts are accompanied by a statement showing the combined assets and liabilities of the Subsidiary Companies.

As a result of our research work, we continue to develop and increase the efficiency of our existing apparatus, as well as introducing new apparatus from time to time. Where we find that a better type of material can be used in our apparatus to enhance their wearing properties, prolong their life, and add to their general utility, we never hesitate to adopt these materials and improvements, notwithstanding the regrettable fact that they add in most cases to the cost of production; but our steady progress, and the high standard of design and quality we have set ourselves, it is our intention to maintain.

There is an impression in some directions that during the past year there has been a substantial reduction in the cost of materials. I am sorry to say this is not the case so far as we are concerned, except in one or two instances of materials of which our consumption is small. You will be aware, of course, that the item of greatest consumption among our raw materials is pig iron, and unfortunately the average cost of this during the past year has exceeded that of the previous year. I would like to tell you that notwithstanding the increased cost of materials and the improvements which, as I have just mentioned, have been embodied in our goods, we have not increased the prices to our customers. In my opinion a concern which pursues this policy, whenever it can make it possible to do so, is well rewarded in the long run by the increased business it brings, and by its effect in holding the confidence and appreciation of the public.

The present year has opened under greater difficulties than I can remember in my business career—which is by no means a short one—but my confidence in Radiation is as great as it has ever been. We are in the enviable position of being the pioneers of the modern gas cooker, gas fire, and domestic hot-water apparatus; the consequence is that the word "Radiation" has become the hall-mark for all goods of the class we make.

I have already told you on a number of occasions of the development of our "New World" cooker with the single oven burner and direct bottom-flue-outlet. The "Disc-Bar" hotplate, to which I referred in my address two years ago, has still further increased the popularity of the "New World" cooker. In the case of the "Disc-Bar" hotplate, as the name implies, a disc is provided over each burner, thus affording a firm support for even the smallest utensil and giving protection against choking of the burner by accidental spilling, or boiling over, of liquids on the hotplate. The burners are of the "Rado" flame-spreading type, characterized by freedom from smell and by complete combustion of the gas, even should the pressure of the gas supply fluctuate. These advantages are not possessed by cookers fitted with drilled ring burners. In passing, I would like to refer once again to the "Regulo," which is supplied with all our "New World" cookers, and by means of which the heat in the oven is automatically controlled during all cooking operations. The "Regulo" is a development of the thermostat which was first employed by us some 30 years ago in connection with our hot-water apparatus, and as a result of this prolonged experience we were able to make it in such a form as to ensure reliable heat control in a gas cooker oven. Inevitably the old adage, "Imitation is the sincerest form of flattery," has been exemplified in the attempts of our competitors to copy our "Regulo," but we have evidence daily of the supreme reliability and accuracy of our "Regulo" as compared with all other similar apparatus on the market, and this is borne out by the sales of our "New World" cookers, which last year were greatly in excess of the previous year—a clear evidence of the confidence the public have in our "Regulo" and the "New World" cooker.

There is another invention of ours to which I wish again to make reference, and that is our "Beam" radiant, which is fitted in all our gas fires. Here again we have more of the sincere flattery of competitors' imitation than we could wish. The pre-eminence of the "Beam" radiant has been maintained during the past year, and it is gratifying to note the growing appreciation in medical circles of the value, as a therapeutic adjunct, of infra-red energy such as is provided by our gas fires. About the date when last I addressed you, Sir Leonard Hill published in one of the medical journals a note dealing with his experiments in the study of the increased resistance to staphylococcal infection afforded by exposure to red and infra-red rays—experiments in which the energy used was obtained from "Beam" gas fires. The results of later work have shown that treatment by infra-red energy alleviates the ill-effects in certain cases of rheumatism and also that the stimulation of the capillary blood flow induced by such treatment removes the unpleasant disfigurement caused by acne. Whereas ultra-violet irradiation by the use of certain electrical appliances may not be undertaken by laymen without the risk of unpleasant after-effects, infra-red energy treatment can be carried out, without fear of accidental over-exposure, with the "Beam" radiant gas fire, by anyone possessing a domestic gas supply. The "Beam" radiant gas fire is not merely an effective room heater, but is in addition an appliance which offers definite advantages as a consequence of the type of energy it provides.

Our research work continues at high pressure because we are dealing with a number of vital problems, our treatment of which, when fully developed, will enable us to maintain—and more than maintain—the pioneer position we have created for ourselves in our various industries.

There are heavy handicaps against which our Gas Industry has to struggle alone. The principal provisions under which gas undertakings operate date back as far as 1847, although some relief was granted in 1920 and 1929. It is the duty of Government to find an opportunity of introducing new legislation that will remove the fetters by which the Gas Industry is hampered in its working at the present time.

Another handicap arbitrarily imposed upon the Gas Industry at the present time is the action of certain municipalities and corporations in compelling tenants of their houses—those least able to bear the burden—to adopt the more expensive form of energy, electricity, for domestic use, a course which has already caused the people concerned to realize the loss resulting from their being deprived of gas for cooking and heating, &c.

In my opinion there is room for the proper development, side by side, of both these important industries, without any need for extraneous and partisan support of either at the expense of the other. The comparison between the cost of electricity and that of gas is all in favour of the latter. This comparison, in a sentence or two, may interest you. Gas is sold by the therm, representing 100,000 heat units. Electricity is sold by the unit, representing 3412 of the same heat units. Taking gas at 9d. per therm, and electricity at 1d. per unit, the heat units purchased in the form of electricity cost three times as much at the same heat units purchased in the form of gas.

Extravagant claims on behalf of the electrical industry will in all probability defeat the end in view. To extol the virtues of electricity in such a way as to lead the general public to hope that it will profit them to use electricity in preference to gas, for heating, cooking, &c., in their homes, will inevitably lead to a rude awakening.

Our overseas trade is, as you will appreciate, hampered and restricted by the tariff barriers which we everywhere encounter. Notwithstanding the difficulties which we experience from this cause, we are continuing to maintain our overseas connections, so that should more favourable conditions arise, we shall be ready to develop our foreign and colonial business. I would welcome any suitable means by which we, as a nation, could obtain bargaining powers through which we could effect a reduction in the tariffs against our goods. Given equality of treatment, the superiority of quality and design of our appliances, combined with their reliability and durability, would ensure an expanding business for us in the overseas markets of the world.

I refer with sincere regret to the death of two of our colleagues during the past year, Mr. James W. Slack and Sir David Brooks—and the retirement of Mr. T. Brunton Peattie from the Board on account of continued ill-health. Mr. Slack had spent the whole of his life in the Gas Industry. He was one of the Managing Directors of Richmonds Gas Stove Company, and a Director of Radiation at the time of his death. His long and ripe experience was of much help to the Company. Sir David Brooks was well known to many of our shareholders; he was a capable lawyer and he will be greatly missed by his colleagues on our Board. I am glad to be able to tell you that the Board were fortunate in obtaining the consent of Mr. Robert W. Elder to accept a seat on the Board. Mr. Elder is one of the best known and most able lawyers in London. Mr. T. Brunton Peattie has rendered very great services to the Company. He joined John Wright & Eagle Range, Ltd., as Secretary thirty years ago, and at a later date he was appointed to a seat on the Board. When Radiation was formed, Mr. Peattie became Secretary and also a Director. I am sure you will all join with me and my colleagues in hoping that in his retirement he will enjoy better health.

In closing, I desire to refer to the high estimation in which we hold the services of the staff of workers in the Company's employ, who have contributed in so valuable a way to the maintenance of the Company's prosperity.

I now have pleasure in moving:

> "That the Directors' Report and Accounts for the year ended 31st December, 1930, as presented by the Directors, be received and adopted, and that Final Dividends be declared as follows: 3 per cent., *less* Income-Tax for the half-year to 31st December, 1930, on the 6 per cent. Cumulative Preference Shares; and 9⅜ per cent., *less* Income-Tax, on the Ordinary Shares, making, with the Interim Dividend paid in October, 1930, a total Dividend of 12½ per cent. on the Ordinary Shares for the year."

PARLIAMENTARY INTELLIGENCE

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Lowestoft Water and Gas Bill has passed its third reading and been sent to the Commons.

By 73 votes to 31, the House of Lords rejected the Stoke-on-Trent Extension Bill for the second time in eight months. The Earl of Midleton moved the second reading. This was supported by the Earl of Donoughmore, who contended that the Newcastle-Wolstanton amalgamation scheme was a new factor in the situation. Earl Peel moved the rejection of the measure; and Lord Onslow, who was Chairman of the Royal Commission on Local Government, supported the rejection. Lord Buckmaster, as was the case last July, made a powerful argumentative speech against the Bill. Speakers in favour of the Bill included the Duke of Atholl, who urged that it should be sent to a Committee in accordance with "immemorial practice." The Marquis of Crewe was one of several noble lords who urged that the practically unanimous wishes of the people of Newcastle and Wolstanton should not be over-ridden.

Special Orders.

The Chertsey Gas Order and the Shrewsbury Gas Order have been passed by the Special Orders Committee and approved by the House.

House of Commons.

Private Bills.

The petition of the London and Home Counties Joint Electricity Authority against the Aldershot, Gas, Water, and District Lighting Bill has been withdrawn. The Bill was referred to the Committee on Unopposed Bills.

The Lowestoft Water and Gas Bill has been read a first time and referred to the Examiners.

The Guildford Gas and Electricity Bill has been passed by the Committee on Unopposed Bills and is awaiting third reading.

A petition has been deposited by the Woking Water and Gas Company against alterations in the Surrey County Council Bill.

Special Orders.

The Special Orders made on the application of the Shrewsbury Gaslight Company and the Chertsey Gas Consumers' Company, Ltd., have been approved by the House.

Nottingham Gas Frauds.

Mr. MORLEY asked the Minister of Health if his attention had been called to recent cases of defalcation on the part of a municipal officer at Nottingham, and if he proposed to take any action by improved audit or other methods to avoid the recurrence of such incidents in municipal finance.

Mr. GREENWOOD said that his attention had been drawn to the case referred to. He understood that the defalcations occurred in the accounts which were audited in the manner provided for in the Municipal Corporations Act, 1882—that was to say, by the Mayor's Auditor and the Elective Auditors—and not in any of the accounts of the Corporation which were subject to district audit. In the circumstances he had no authority to intervene.

Development of Gas and Electricity Undertakings.

Brigadier-General CLIFTON BROWN asked the Minister of Transport whether he had considered the protests sent to him from municipal and other gas companies protesting against his action in recommending electricity at the expense of gas companies, and whether he would receive deputations on the subject.

Mr. HERBERT MORRISON, in reply, stated that the conferences which he had recently held with representatives of electricity supply undertakings were arranged with a view to urging them to provide additional employment by expediting their development; and he pointed out that the continued development of the two industries had not proved incompatible. He had not been approached directly on the subject by municipal or other gas undertakings.

Brigadier-General BROWN then asked if he would be willing to receive any deputation from municipal bodies on the subject.

Mr. MORRISON replied that when an application was received he would consider it, but he was not convinced that he had committed any offence.

Sir KINGSLEY WOOD then asked if the Right Hon. Gentleman had seen a letter of protest signed by two members of his own Party which appeared in the Press.

Mr. MORRISON replied that he had seen letters of protest from the Gas Industry, but he was certain they were drafted and signed under a complete misapprehension of the facts.

Brentwood Gas Company.

The Annual General Meeting of the Brentwood Gas Company was held at the Town Hall—Col. F. LANDON, V.D., Chairman of Directors, presiding.

The Directors submitted the following report for the year ended Dec. 31, 1930: The balance carried to profit and loss account is £9207, and this amount added to the balance brought forward from last year, £3293, makes a total of £12,500. After providing for income-tax, loan interest, and other charges, there remains a balance of £9134 available for distribution. From this amount interest and dividends have been paid as follows: On the perpetual debenture stock at the rate of £5 10s. p.ct. per annum; on the preference stock at the rate of £5 p.ct. for the year; on the redeemable preference stock at the rate of £6 p.ct. for the year; and interim dividends at the rate of £8 p.ct. per annum on the original stock and £5 12s. p.ct. per annum on the additional stock (all *less* tax). The Directors recommend payment of final dividends (*less* tax), which, with the interim dividends already paid, will make £8 p.ct. on the original stock and £5 12s. p.ct. on the additional stock for the year. These dividends, together with the interim and preference dividends, will amount to £5743, leaving a balance of £3390 to be carried forward.

Moving adoption of the report, Col. F. LANDON said: The demand for gas appliances continues at a very satisfactory pace; 504 cooking and heating appliances have been sold from our showrooms during the past year, in addition to a large number let on hire.

Mr. C. E. LEWIS seconded, and Mr. W. B. FARQUHAR moved the payment of dividends as recommended.

Subsequently a Special General Meeting was held for the purpose of considering a resolution approving the Bill for amalgamation with the Gas Light and Coke Company. Col. F. LANDON proposed the following resolution:

> That the Bill now submitted intituled a Bill to provide for the transfer to the Gas Light and Coke Company of the undertakings of the Southend-on-Sea and District Gas Company and the Brentwood Gas Company to confer various powers upon the Gas Light and Coke Company and for other purposes be approved subject to such additions, alterations, and variations as may be made in the Bill by Parliament and approved of by the Directors.

Mr. W. F. CHURCH seconded the resolution, which was carried unanimously.

Eastbourne Gas Company.

After setting aside over £6400 for the benefit of its employees—in co-partnership and superannuation—the Eastbourne Gas Company had a profit of £19,000 on its revenue account for the past year, and at the annual meeting the usual dividends of 5, 7, and 8½ p.ct. were declared on the different stocks.

Mr. FRANK H. JONES, C.E. (Chairman), presided, and in moving the adoption of the report and accounts, pointed out that the past year had been one of very considerable difficulty. He supposed that nearly all industrial undertakings, and private individuals, had not found 1930 a very easy year. The Eastbourne Gas Company had more consumers now than at this time last year, but had sold less gas, but it was not a serious reduction. The chief reason, however, in his opinion for the decreased sale of gas in Eastbourne was that consumers had to be a little more careful about what they spent.

Dealing with the capital account, the Chairman said they had spent a certain amount of money and written down quite a large amount. Most of that had gone in laying mains in new districts or enlarging mains, in new meters and apparatus, and last year in the purchase of freehold premises for nearly £5000.

Expenditure on coal, materials, and wages was not substantially different. In the revenue account would be seen an item that would please all the shareholders as it had also pleased the Board—namely, the allocation of a sum only £2 10s. short of £3000 to the co-partnership scheme. The Company had obtained the right men, and it gave the Board great pleasure to know that those employees now owned something like £25,000 worth of stock in the Company. The shareholders would also see that the Board had done something else for the employees, having allotted £3466 for superannuation. The income from residuals was very good. New debenture stock was raised last year, and the expenses, £1284, had been charged to the current year's profit and loss account.

Mr. B. BRADFORD seconded the motion, and said it was a source of great satisfaction to know that, notwithstanding the great depression that prevailed last year, the Company's dividends were being maintained. They looked forward to the opening of the new showroom and the improved office accommodation that would be available in the course of a month or six weeks. He felt certain that these improvements would prove of im-

mense advantage to the Company and give a great impetus to its business.

The CHAIRMAN proposed a resolution authorizing the payment of the dividends, as set out in the Directors' report; and Alderman SODDY seconded the motion, which was adopted.

Wrexham Gas Company.

The Ordinary General Meeting of the stockholders of the Wrexham Gas Company was held at the Company's Offices—Mr. CHARLES MURLESS (Chairman of the Directors) presiding.

The CHAIRMAN, in moving the adoption of the Directors' report and statement of accounts, said: The total revenue from the sale of gas amounted to £36,632, which is £343 less than in the previous year. This is accounted for by a reduction in the price of gas; otherwise this item would have shown a substantial increase, as during the year there was an increase of over 2 million c.ft. in the make and sale of gas. The rental of meters is slightly up at £405, but the rental of cookers at £170 is £10 less than in the previous year, owing to consumers having purchased their own cookers, many having taken advantage of the very favourable hire-purchase terms we have recently introduced. The sale of bye-products realized a total sum of £9661, about the same as in the previous year; actually the revenue from the sale of coke was more, but this was rather more than counterbalanced by the reduced prices received for tar and sulphate ammonia.

Turning to the manufacturing charges on the expenditure side, coal has cost rather more, but the remaining items are lower, so that the total expenditure of £23,773 is slightly lower than in the previous year. The distribution charges, amounting to £6187, are a little more owing to the increased number of consumers and extended mileage of mains now in use. Rates and taxes amounted to £2978, a reduction of £596 as compared with the previous year. The management charges, totalling £2511, are higher by £179, principally due to increased advertising undertaken in regard to the opening of our new showrooms.

The gross profit for the year, amounting to £9134, has been carried forward to the profit and loss account, and the balance to the credit of this fund stands at £12,911, which is, however, subject to the dividends to be declared to-day, and which will absorb £3642, so that the net balance to be carried forward to next year's account will amount to £9269. Our two reserve funds are both full with £13,204 each.

There has been a considerable increase in the number of consumers connected up, and we have still a large number of applications on hand. The additional consumers number 350, and the total number of consumers now exceeds 10,000. We have also fixed 115 additional gas fires, 65 gas wash-boilers, 245 ordinary cookers, 60 high-grade cookers, 139 boiling rings, and a large number of hotplates, geysers, circulating boilers, grillers, radiators, gas irons, &c. Forty-six additional street lamps have also been fixed in the district.

Dr. RICHARD WILLIAMS seconded, and the motion was carried.

The CHAIRMAN then moved that the interim dividend paid upon redeemable preference stock and upon ordinary stock in September last be confirmed, and that dividends on the redeemable preference stock at the rate of 3½ p.ct., and on the ordinary stock at the rate of 2⅝ p.ct. for the half-year ended Dec. 31 last, being at the rate of 7 p.ct. and 5¼ p.ct. per annum respectively, be declared.

Southampton Gaslight and Coke Company.

The Annual Ordinary General Meeting of the Southampton Gaslight and Coke Company was held at the Central Offices and Showrooms, 66, Above Bar, Southampton. Sir H. W. RUSSELL BENCRAFT, M.R.C.S. (Eng.), J.P. (Chairman), presided.

In proposing the adoption of the report and accounts for the year ended Dec. 31, 1930, the CHAIRMAN said: Our output of gas shows an increase of 5·9 p.ct. over the previous year. More coal was used, and the cost of coal for the year has risen. Maintenance of works is higher; it includes charges for the modernization of coal-conveying plant and the carburetted water gas plant. Distribution of gas shows a small increase. A further contribution of £4000 has been made to the superannuation funds. The amount standing to the credit of the funds is now £24,000.

The gross profit is £1813 less than in 1929, and, after paying interest on debenture stock, bank interest, and income-tax, the balance left is sufficient to pay the maximum dividend of 5 p.ct. on the ordinary stock and 5½ p.ct. on preference stock, and to carry forward to the next account £4827.

To meet the ever-increasing demand for gas, a contract for an installation of intermittent chamber ovens, capable of producing 2,400,000 c.ft. of gas per day, has been placed with Messrs. Woodall-Duckham & Co., Ltd. The work has been commenced, and it is hoped to have the plant at work by the end of this year. A sports pavilion for the use of the Company's employees was opened in July last.

The MANAGING DIRECTOR (Mr. J. R. H. Jacobs), seconding the resolution, said: Our consumers have increased by 83 p.ct. in the last twenty years. In 1910 we had 28,000 consumers. To-day we have 51,000, and we are adding to those consumers at the rate of about 2500 to 3000 per annum. In regard to gas for cooking, in 1910 we had 19,000 cookers in use. To-day we have 41,000. I am speaking now of cookers on hire. In addition to that, we have sold in the last five years 4500 cookers, 3000 geysers, 4500 coppers, 3500 fires, and a large number of other apparatus, both large and small.

News from the Antipodes

Metropolitan Gas Company of Melbourne.

In the course of his address at the 106th Half-Yearly Meeting of the Metropolitan Gas Company of Melbourne, held at the Offices of the Company, on Wednesday, Jan. 28, the Chairman (Sir JOHN GRICE) said:

Coal, including materials used in production of carburetted water gas, cost £266,654, compared with £429,855 for the December half of 1929—the difference being accounted for by the very high-priced imported coal used during the 1929 period. Tonnage of coal carbonized was 131,733, and 971,646 gallons of oil and 8797 tons of coke were also used. The revenue from gas sales was £723,370—a decrease of £67,878 over the similar period of 1929. Sales of gas for the half-year reached 2,010,348,000 c.ft., compared with 2,180,940,000 c.ft. for the corresponding period in 1929—a decrease of 7·82 p.ct. Taking the complete year 1930, sales totalled 4,032,719,000 c.ft., against 4,222,391,000 c.ft. for the year 1929—a decrease of 189,762,000 c.ft., equal to 4·49 p.ct. Having regard to the conditions obtaining in Australia, the returns may be regarded with some satisfaction.

Receipts from residuals, £103,493, were lower by £32,385 than for the December half of 1929. The revenue from coke is £37,563 lower than for the 1929 period—17,970 tons less having been sold. The tar position has rapidly improved—a substantial reduction being shown in stocks. The capacity of the "Bitural" plant at West Melbourne has been increased from 200,000 to 500,000 gallons per annum, and the new process gives every indication of proving more than a very useful outlet for our crude tar.

The report shows that the net profits for the half-year amounted to £135,370. Of this sum £50,000 has been debited to net revenue account to provide for writing down plant at West Melbourne certified by the Engineer to be obsolete. The payment of a dividend at the rate of 6s. 6d. per share is recommended, leaving £879 to be added to the carry-forward. It may be advisable again to point out that a dividend of 6s. 6d. per share per half-year represents an annual return to shareholders of 7·97 p.ct.

Considering the almost complete cessation of home building in the metropolitan area, the sale of appliances by the Stove and Fittings Department may be regarded as satisfactory, results for 1930 being as follows:

Cooking stoves	3309
Bath heaters	1514
Wash-coppers and burners under coppers	751
Fires and radiators	421
Grillers, hotplates, and boiling burners	1128

During the year 151 large cooking and 77 water heating appliances have been supplied to hospitals, hotels, cafés, restaurants, &c. It is gratifying to record that in many cases these appliances have been installed as additional equipment in kitchens where consumers have previously experienced the advantages of gas.

The Chairman then moved the adoption of the report and balance-sheet. The motion was seconded by Mr. H. J. H. BODY, and carried unanimously.

Auckland (New Zealand) Gas Company.

At the Annual Meeting of shareholders in the Auckland Gas Company, Ltd., the Chairman of Directors, Sir GEO. ELLIOT, presided.

In moving the adoption of the report and statements of account, the CHAIRMAN said: The total receipts from the sale of gas, together with the balances of the various accounts, amount to £463,318, less by £2296 than those of last year. Against this drop in the income, however, the working expenses, amounting to £347,188, show a reduction of £4503. In addition to gas, our primary product, we manufacture and sell secondary products—coke, tar, and ammonia. We also manufacture high-grade fireclay and silica refractory goods at our brickworks, and, in our workshops, we make gas appliances of various descriptions for industrial use and for kitchen equipment in hotels and res-

taurants. It is a reduced income from these secondary products that accounts for the slight reduction of revenue referred to.

Not so very long ago we had on our books an account for public lighting. This, however, has disappeared, the City Council and local bodies having installed electricity in place of gas. The greatest sum we ever received, in any one year, for public lighting, was £12,955. A comparison of this amount with the items for public lighting appearing in the accounts of the two local Electrical Power Boards, totalling approximately £50,000, will give some indication of the great rise in the annual cost that has taken place in recent years for the supply of street lighting in the City of Auckland and suburbs. Gas was supplied for street lighting purposes at a rate per 1000 c.ft. much below that charged to private consumers; in the use of electricity, however, the very opposite is the case, the price charged to local bodies being much more per unit than that charged to private consumers, notwithstanding the fact that overhead costs in the case of the private consumers are enormously greater. This example is given merely to show the penalty a privately-owned industry in New Zealand has to bear as compared with a similar industry publicly owned.

During the year under review the Company bought coal to the value of £101,905 from New Zealand mines, bought goods to the value of £81,734 from merchants in Auckland, paid £153,830 in wages, and £23,487 in taxes. During the year services were connected up with the premises of 909 new consumers, bringing the total number up to 48,182. Twenty miles of new mains have been laid, making the total mileage 662, and 2206 cookers have been installed, making the total number supplied by the Company 40,731. Under prevailing conditions these results may be considered satisfactory. The total dividend suggested for the year amounts to £89,996. This amount is equal to 6·6 p.ct. on the total capital expenditure of the Company—viz., £1,360,582. I now have pleasure in proposing that the report and balance-sheet be adopted.

The motion was seconded by Mr. A. CLARK, and carried unanimously.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Berkhampstead Gas Company.

To prescribe the standard price for gas, and to make other provisions.

Cannock, Hednesford, and District Gas Company, Ltd.

To provide for the transfer to the Company of the undertaking of the Ogley Hay and Brownhills Gas Company, Ltd.; to authorize the raising of additional capital; to confer further powers upon the Company; and to extend the limits for the supply of gas.

Hornsey Gas Company.

To empower the Company to grant pensions, to make provision as to the sale of share capital by auction or tender, and for other purposes.

Wantage Urban District Council.

For the repeal of the Wantage Gas Order, 1879, and for the granting of a new Order making provisions with regard to the gas undertaking.

Trade Notes.

New Holder for Herne Bay.

Messrs. Newton, Chambers, & Co., Ltd., have received an order for a spiral-guided gasholder of ½-million c.ft. capacity for the Herne Bay Gas Company.

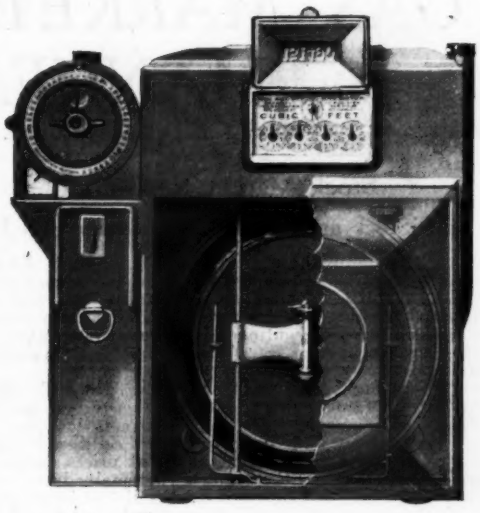
New Purifiers for Belfast.

The middle section of the coal gas purifiers in the Belfast Gas-Works, installed in 1894, is being removed and luteless purifiers installed in its place. As it is not possible to shut down more than one set of purifiers each year, the entire work will cover a period of four years. The cost will be met out of revenue. A complete new set of four luteless purifiers and one catch purifier will be installed, and the cost of this plant will be met out of revenue or reserve fund. The tender of Messrs. R. & J. Dempster, Ltd., was accepted for the supply and erection of the four luteless purifiers, one catch purifier, and oxide handling plant, &c., and that of the same firm for the dismantling of the existing purifiers and the supplying of two cast-iron luteless purifiers in their place.

Carbonizing Plant.

Messrs. Robert Dempster & Sons, Ltd., of Elland, have received an order from the Sowerby Bridge Gas-Works for two complete regenerator-producers and settings of eight through retorts. The regenerators are of the modern 2-ply 2-row construction (composed of rectangular machine-made tubes grouped back-to-back), and one producer is furnished with the non-clinkering inclined screen-bar grate.

Messrs. Dempsters have also received an order from the Louth Gas-Works for modernizing one bed, by underpinning the pier-walls to accommodate the depth required by the more modern and efficient regenerator-producer and setting of seven retorts. The producer is fitted with a non-clinkering inclined screen-bar grate, and the regenerators are of the 2-ply 2-row tubular construction.



THE HEART OF A METER IS THE BELLOWS.

THE BELLOWS FITTED BY

SAWER & PURVES

(BRANCH OF METERS, LTD.)

ARE UNIQUE IN DESIGN AND ARE

SECOND TO NONE!

THE PRODUCT OF 60 YEARS' EXPERIENCE.

ESTABLISHED 1869.

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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

With the opening of the new Account on the Stock Exchange last week there was no marked increase in the volume of business. The general tone, however, was satisfactory, and as the week progressed the atmosphere became distinctly cheerful. The gilt-edged market continued the dominant feature, and fractional increases were established in several instances in British Funds.

There is no doubt that many investors are still adhering to the policy of "safety first;" and in this respect gas issues have been by no means neglected. Business last week was heavier than for some time past, and prices continued firm. In a number of cases stock changed hands at prices higher than last week's best, though the quotations remained unchanged. Imperial Continental ordinary headed the list of increases with a gain of 10 points to 370, while Barnet ordinary rose 3 points to 120½. Southampton 5 p.ct. maximum gained 2 points to 76½, at which figure the yield works out at £6 10s. 8d. This price is the lowest at which business was recorded last year (the highest being at 79½), so that for a security of this class some further improvement would appear to be justified. At the Provincial Exchanges, Bristol and Liverpool ordinary stocks showed fractional increases, while the former Company's 5 p.ct. debenture rose to par—an increase of 4 points.

Apart from *ex* div. reductions, the only falls occurred in Newcastle £1 units (on the Newcastle Exchange) by 6d. to 17s. 6d.. and Colombo £1 ordinary shares by a similar amount to 32s. 6d.

The accounts of the British Gas Light Company show a net profit for 1930 of £79,298, against £83.694 for the previous year. The Directors recommend a final dividend of 4 p.ct. on the ordinary stock, making 7½ p.ct. for the year (same), and, after allowing for this and the transfers to reserve, there remains £86.069 to be carried forward, as against £85.212. The Company is shortly raising additional capital to meet the continued expansion of business, and an extraordinary meeting has been called at which resolutions will be submitted to cancel the unissued shares, and then to increase the capital to £1,500,000 by the creation of 545,000 £1 shares for issue upon such terms and with such rights as the Directors shall determine.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 23.

The values of tar products are as follows:

Pitch, 45s. per ton f.o.b.

Creosote, for export, 5½d. per gallon f.o.b.

Pure toluole, 1s. 10d. to 1s. 11d. per gallon; pure benzole, 1s. 6d. to 1s. 7d. per gallon; solvent naphtha, 95/160, about 1s. 5d. per gallon; and pyridine bases, 3s. 6d. to 3s. 9d. per gallon.

All prices of spirits are *ex* sellers' works.

Tar Products in the Provinces.

March 23.

The average prices of gas-works products during the week were: Gas-works tar, 17s. 6d. to 21s. 6d. Pitch—East Coast, 42s. 6d. to 43s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 42s. 6d. to 43s. f.o.b.* Toluole, naked, North, 1s. 6¾d. to 1s. 7¼d. Coal-tar crude naphtha in bulk, North, 5½d. to 6¼d. Solvent naphtha, naked, North, 1s. 2d. to 1s. 2½d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 1¼d.; Scotland, 3¼d. to 3¾d. Heavy oils, in bulk, North, 5⅞d. to 5⅞d. Carbolic acid, 60's, 1s. 1d. to 1s. 2d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *March* 21.

A moderate amount of business has been placed during the week, principally in refined tars and better class creosotes, but quotations are unaffected.

Pitch.—With few orders passing quotations are nominal at 40s. per ton f.o.b. Glasgow for export and about 42s. 6d. per ton f.o.r. works for home trade, both in bulk.

Refined tar to Ministry of Transport Specification appears to have settled at to-day's level of 2½d. to 2⅝d. per gallon f.o.r. makers' works in buyers' packages.

Creosote.—Makers' quotations remain steady. B.E.S.A. Specification is 2⅝d. to 3d. per gallon; low gravity, 3⅜d. to 3⅝d. per gallon; and neutral oil, 3d. to 3¼d. per gallon—all f.o.r. in bulk.

Cresylic.—Some movement is noticeable, but not in sufficient quantity to affect prices. Pale, 97/99 p.ct., is 1s. 5d. to 1s. 6d. per gallon; dark, 97/99 p.ct., 1s. 4d. to 1s. 5d. per gallon; and pale, 99/100 p.ct., 1s. 7d. to 1s. 8d. per gallon—all f.o.r. works.

Crude naphtha.—There is a continued outlet at 4d. to 4¼d. per gallon in buyers' rail-tanks f.o.r.

Solvent naphtha.—Conditions remain quiet. 90/160 is 1s. 2d. to 1s. 3d. per gallon, and 90/190, about 1s. per gallon.

Motor benzole.—Trading is on a small scale. Value is about 1s. 2d. to 1s. 3d. per gallon in bulk.

Pyridines remain quiet, with 90/160 grade at about 3s. to 3s. 3d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole:

	s. d.		s. d.	
Crude benzole	0 5½	to	0 6⅜	per gallon at works
Motor ,, ...	1 0	,,	1 1	,, ,, ,,
Pure ,, ...	1 4	,,	1 5	,, ,, ,,

New Capital Issues.

Great Yarmouth Gas Company.—The tenders for the issue of £14,490 5½ p.ct. perpetual debenture stock in this Company, offered for sale by Messrs. A. & W. Richards, ranged from £105 per £100 down to the minimum of par, the average price obtained being £100 13s. 5d. p.ct.

Preston Gas Company.—The issue of £93,000 5 p.ct. preference stock by the Preston Gas Company was over-subscribed, the average price received being £93 14s. 1d. p.ct. Allotment letters were posted on March 18. The newspaper publicity and the advertising of the prospectus were handled entirely by Messrs. Sells, Ltd., Financial Publicity Department, 168, Fleet Street, E.C. 4.

Bognor Gas and Electricity Company.—The tenders sent in for the £30,000 5½ p.ct. redeemable debenture stock, which were offered on behalf of the Directors of this Company, were opened on March 19, the total amount of stock applied for being £133,970 at prices ranging from £105 per £100 down to the minimum of par. The lowest successful tender was at £102 5s. per £100, and the average price obtained was £102 11s. 5d. p.ct.

Uxbridge Gas Company.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of the Uxbridge, Maidenhead, Wycombe, and District Gas Company, an issue of £51.557 5 p.ct. perpetual debenture stock at the minimum price of issue of £98 per £100 stock, yielding at that price £5 2s. p.ct.; also £33.575 ordinary stock at a minimum price of £105 per £100 stock, yielding at that price £6 13s. 4d. p.ct. Tenders must be received not later than Tuesday, March 31.

Contracts Advertised To-Day.

Gasholder and Tank.

The Skegness Gas Department invite tenders for the construction of a three-lift spiral-guided gasholder in steel tank. [Advert. on p. 812.]

Lead, Lead Wool, &c.

The Oldham Corporation Gas-Works Committee invite tenders for the supply of lead, lead wool, and yarn. [Advert. on p. 812.]

Pipes and Specials.

The Oldham Corporation Gas-Works Committee invite tenders for the supply of pipes and specials. [Advert. on p. 812.]

Valves.

The Oldham Corporation Gas-Works Committee invite tenders for the supply of valves. [Advert. on p. 812.]

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Mar. 20.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C. ...	73—78	...	...
522,932	,,	,,	4	4	Do. 4 p.c. Pref. ...	75—80	...	...
1,551,868	,,	Oct. 9	7⅞	7⅞	Alliance & Dublin Ord. ...	100—105	...	...
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
522,655	,,	Mar. 5	7	7	Barnet Ord. 7 p.c.	118—123	+3	120—121
300,000	1	Oct. 23	1/7½	1/4½	Bombay, Ltd.	16/—18/-	...	...
174,500	10	Mar. 5	9	9	Bournemouth 5 p.c. ...	14½—15½	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12½—13	...	...
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	10¾—11¼	...	...
50,000	Stk.	Dec. 18	3	3	Do. 3 p.c. Deb. ...	60—63	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	81—84	...	...
357,900	,,	Aug. 28	7½	7½	Brighton & Hove 6 p.c. Con.	112—117	...	115
371,880	,,	,,	6¾	6¾	Do. 5 p.c. Con.	102—105	...	103¾
1,287,500	,,	Feb. 19	5	5	Bristol 5 p.c. max.	94½—95½[a]	+½	...
120,420	,,	Dec. 18	—	—	Do. 1st 4 p.c. Deb. ...	78—80[a]	...	...
217,870	,,	,,	—	—	Do. 2nd 4 p.c. Deb. ...	78—80[a]	...	...
328,790	,,	,,	—	—	Do. 5 p.c. Deb.	99½—100½[a]	+4	...
855,000	,,	Sept. 25	8	7	British Ord.	110—115	...	115 - 116
100,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	109—114	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	74—77	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	92—97	...	...
160,000	,,	Jan. 8	5	5	Cambridge 5 p.c. Deb. ...	95—98	...	...
100,000	10	Dec. 4	10	6	Cape Town, Ltd.	9½—10¼	...	9⅞—10
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	6¾—7¾	...	...
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb. ...	72—77	...	...
626,860	,,	Feb. 19	6	6	Cardiff Con. Ord.	95—98	...	...
237,860	,,	Jan. 8	7½	7½	Do. 7½ p.c. Red. Deb. ...	97—100	...	...
157,150	,,	Feb. 19	5	6½	Chester 5 p.c. Ord.	83½—88½[b]	...	...
98,936	1	Oct. 9	†2/-	†2/-	Colombo, Ltd. Ord.... ...	30/—35/-	—/6	...
24,500	1	,,	1/4¼	1/4¼	Do. 7 p.c. Pref.	18/—20/-	...	...
609,204	1	Oct. 9	1/9¾	1/4¾	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...	...
296,053	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	18/—20/-	...	...
2,073,280	Stk.	Feb. 19	6	6	Commercial Ord.	93—96	...	94½—96
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	57—60	...	57½
787,560	,,	Feb. 19	7	7	Croydon sliding scale ...	107—110	...	...
453,100	,,	,,	5	5	Do. max. div.	82—85	...	...
542,270	,,	Mar. 5	7	10	Derby Con.	120—123[c]	...	...
55,000	,,	Dec. 18	4	4	Do. Deb.	65—70[c]	...	...
209,000	,,	Mar. 5	5	5	East Hull Ord. 5 p.c. ...	72—75	...	...
1,002,180	,,	Mar. 19	†4	†6½	European, Ltd.	93—98[a]	—½	98—100
18,953,033	,,	Feb. 19	5§	5§	Gas Light & Coke 4 p.c. Ord.	18/3—19/3[f]	...	18/4½—18/10½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	62—65	...	63⅜—65
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	77—80	...	77⅛—79
5,694,095	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb. ...	60—63	...	60—62
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—103	...	101¼—102
161,480	,,	Mar. 5	10	10	Harrogate Cons. 10 p.c. max.	158—163	...	...
82,500	,,	Mar. 19	7	7	Hastings & St. L. 5 p.c. Conv.	98—103[a]	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	82—85[a]	...	...
70,000	10	Oct. 9	§	10	Hongkong & China, Ltd. ...	13—14	...	13⅛—13 7/16
213,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	89—92	...	...
2,436,594	,,	Nov. 6	25	15	Imperial Continental Cap.	360—380	+10	357—370½
223,130	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	78—83	...	...
235,242	,,	Mar. 5	8½	8½	Lea Bridge 5 p.c. Ord. ...	124—129	...	...
2,145,907	,,	Feb. 19	6	6	Liverpool 5 p.c. Ord. ...	97¾—98½[b]	+¼	...
600,000	,,	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	96¼—98½[b]	−2¼	...
165,736	,,	Feb. 19	9	9	Maidstone 5 p.c. Cap. ...	128—133	...	...
63,480	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	54—57	...	...
75,000	5	Dec. 4	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne)	6—6¼	...	...
392,000	—	Oct. 1	5½	5½	5½ p.c. Red. Deb.	88—91	...	...
675,000	Stk.	Nov. 20	†8	†6	Montevideo, Ltd.	95—105	...	94—96
2,061,315	,,	Mar. 5	5	5½	Newcastle & Gateshead Con.	17/3—17/9[d][f]	—/6	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	72½—74¼[d]	...	...
691,705	,,	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	67½—68¾[d]	...	...
277,285	,,	Nov. 5	5	5	Do. 5 p.c. Red. Deb.	98—100[d]	...	...
199,940	,,	Mar. 5	7½	7½	North Middlesex 6 p.c. Con.	115—120	...	...
396,160	,,	Feb. 5	5	5	Northampton 5 p.c. max. ...	74—79	...	...
300,000	,,	Nov. 20	7	9	Oriental, Ltd.	100—110	...	...
60,000	5	13 May, '15	—	—	Ottoman	0—¼	...	...
205,162	Stk.	Dec. 18	8	8	Plym'th & Stonehouse 5 p.c.	110—115	...	111—112½
424,416	,,	Feb. 19	8	8	Portsm'th Con. Stk. 4 p.c. Std.	122—127	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	78—81	...	79¾
686,312	,,	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	83—86	...	86
389,813	,,	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	84—87	...	...
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref. ...	8½—8¾	...	...
1,736,968	Stk.	Mar. 19	6¼	6½	Sheffield Cons.	102½—104½[e]	−2½	...
95,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	78—80[e]	...	...
90,000	10	June 5	‡4	‡5	South African	4—6	...	...
6,709,895	Stk.	Feb. 5	5	7½	South Met. Ord.	103—106	...	103¾—104¾
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	111—114	...	...
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb. ...	59—62	...	59½—61½
734,000	,,	Mar. 5	6¼	6¼	Do. 6¼ p.c. Red. Db.	98—100	+¼	...
1,000,000	,,	Jan. 22	—	4	Do. 5 p.c. Red. Deb.	100—103	...	102½
91,500	,,	Mar. 5	8½	8½	South Shields Con.	107—109[a]	...	...
1,543,795	,,	Feb. 19	6½	6½	South Suburban Ord. 5 p.c.	101—104	...	102—103
668,837	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	100—103	...	101¾
647,740	,,	Feb. 19	5	5	Southampt'n Ord. 5 p.c. max.	75—78	+2	76—78
121,275	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	75—78	...	...
179,014	,,	Mar. 5	8	8	Sutton Ord.	120—130	...	...
94,500	,,	Jan. 8	5	5	Do. 5 p.c. Deb.	96—99	...	...
250,000	,,	Mar. 5	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	,,	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	100—103	...	...
1,076,490	,,	Mar. 5	6⅝	6⅝	Tottenham District Ord. ...	101—105	...	103½—104½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	101—104	...	...
199,005	,,	Dec. 18	4	4	Do. 4 p.c. Deb. ...	77—80	...	...
85,701	,,	Mar. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	74—79[a]	...	...
310,694	,,	Mar. 5	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	95—100	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	88—93	...	...
1,322,220	,,	Mar. 5	7	7	Wandsworth, Wimbledon, and Epsom Cons. ...	110—113	...	111½
426,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	93—96	...	...
1,013,464	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	100—103	...	101—101½

Quotations at:—*a*.—Bristol. *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle. *e*.—Sheffield. *f*.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. = 10 p.ct. p.a. less tax and less tax on interim dividend.

GENERAL
IMMERSION
Indirect Water Heater

Unique and Different

Adoption means Progress

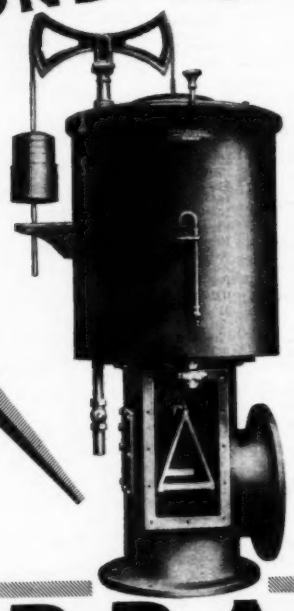
THE SECRET OF A CHEAP & ABUNDANT SUPPLY of HOT WATER

LOW INITIAL COST
LOW INSTALLATION COST
MINIMUM GAS CONSUMPTION
NEGLIGIBLE MAINTENANCE COSTS
HARD AND SOFT WATER TROUBLES DISAPPEAR
NO DISCOLORATION OF WATER
NO CORROSION OF INTERNAL FLUES
NO CONDENSATION
NO DEPOSITS IN FLUES OR BOILER
WORKS INDEPENDENTLY OR IN CON. JUNCTION WITH THE RANGE BOILER

GENERAL GAS APPLIANCES LIMITED
Guide Bridge Manchester.

RETORT-HOUSE GOVERNORS

SECOND TO NONE



Braddock's Patent Retort House Governors are unsurpassed for general excellence.

Especially desirable for use with vertical retorts.

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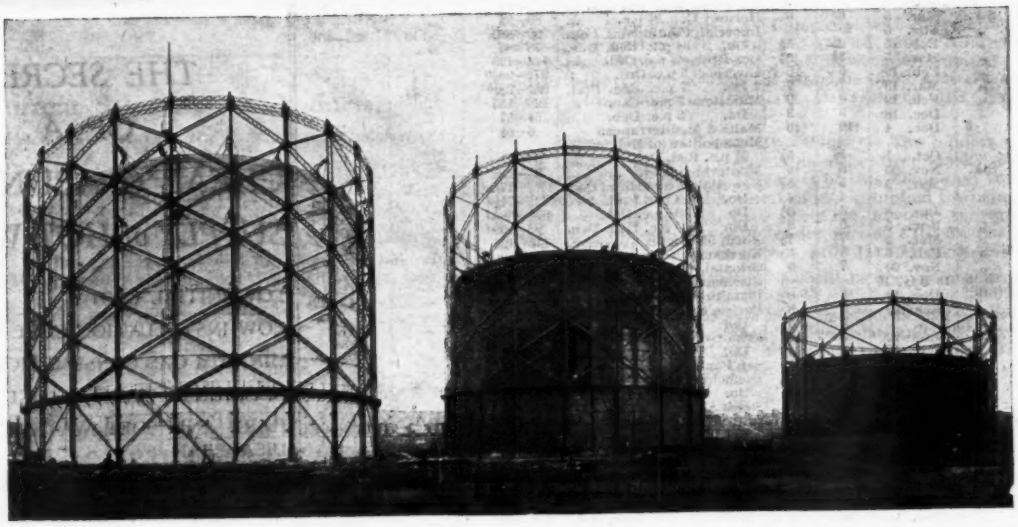

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